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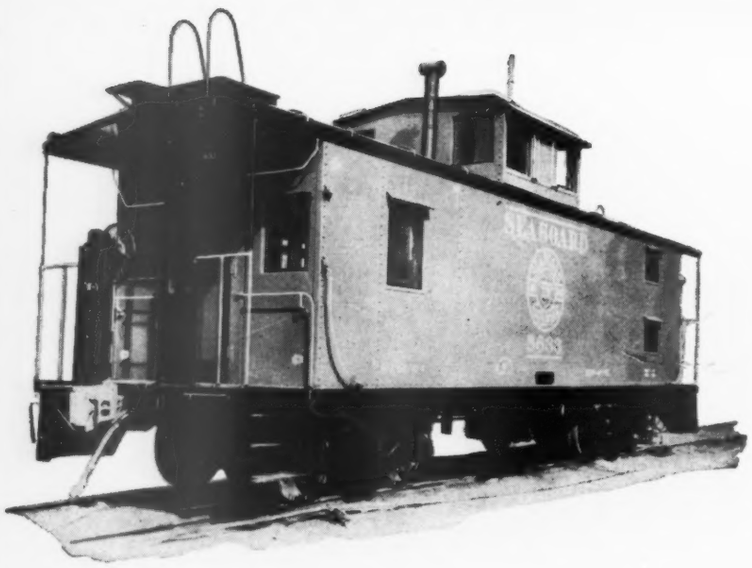

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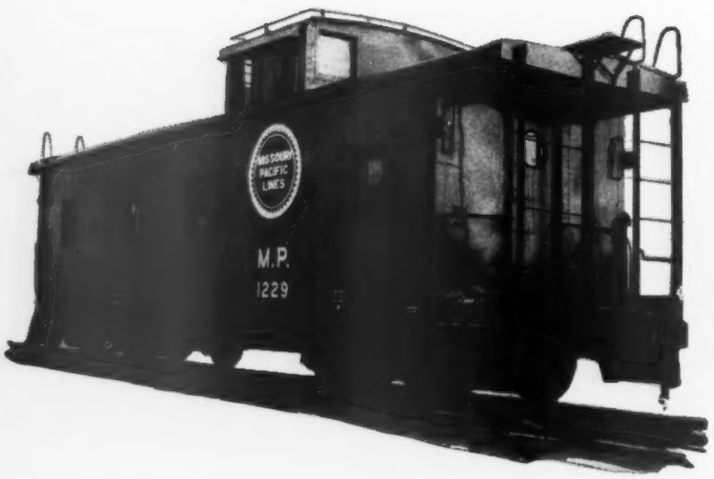

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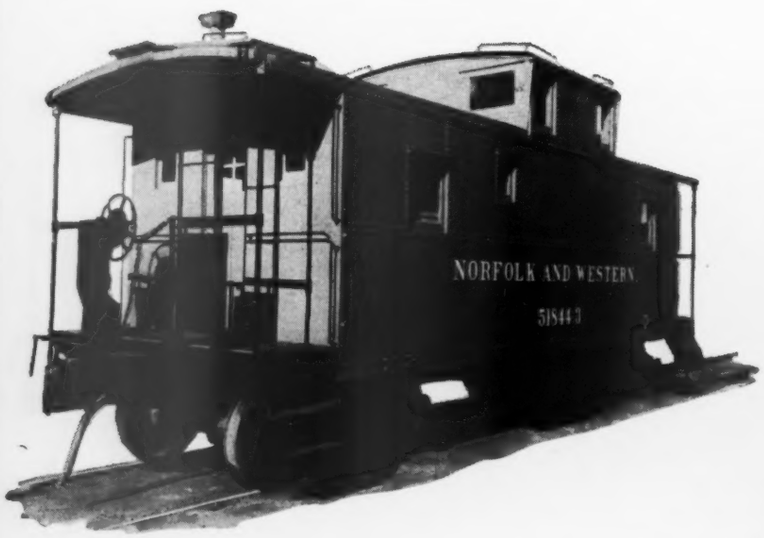

December, 1953

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the 6-motor road switchers are giving very satisfactory service on 4 per cent grades at altitudes of better than 7000 ft. And they are doing an equally good job on the difficult run between Martin and Provo, Utah, with two units in multiple on the head end and four units in multiple in helper service hauling a train of 85 cars of coal—6400 actual tons—up the 2.4 per cent ruling grade between Martin and Soldier Summit, Utah."

"The Utah," adds Mr. Kane, "is looking forward to still lower operating ratios and greater efficiency with delivery next summer of three additional Alco 6-motor road switchers."

You Get More Tons per Train with Alco 6-Motor Road Switchers

The Utah's experience is by no means unique. On *another* major Western road, for example, a single Alco 6-motor road switcher recently hauled 1343 trailing tons up a grade of 2½ per cent. *This was the heaviest load ever hauled up this grade by a single diesel locomotive.* Tractive effort was 85,000 pounds at 23.8 per cent rail adhesion.

In starting tests on yet another Western road, this same 1600-hp unit recorded 105,000 pounds tractive effort at 29.2 per cent adhesion while pulling 3402 trailing tons. Results like these explain why Alco 6-motor road switchers have tripled in sales every year since their introduction.

These rugged diesel-electrics are designed specifically for your heavy-drag assignments. With gross weight of 180 tons, they give up to 50 per cent greater tractive effort than 4-motor units of equal horsepower. Their ability to haul more tons per train cuts costs per MGTM by as much as 25 per cent.

An additional feature: Alco 6-motor road switchers are easy to operate in multiple. Thus they not only pack the pull for your big jobs but also provide economical motive power for your short-freight and switching assignments.

The 1600-hp 6-motor road switcher is only one of five road switchers engineered by Alco to give you *better motive power for greater earning power.* Your nearest Alco locomotive representative can give you the whole story.

Condensed Specifications for Alco 1600-HP 6-Motor Road Switchers

Weight
Fully loaded ..... 360,000 lb
On drivers ..... 360,000 lb
(Can be obtained in stepped weights from 280,000 to 360,000 lb)

Principal Dimensions
Length (inside knuckles) 56 ft 5¾ in.
Height ..... 14 ft 8¼ in.
Width (maximum) ..... 10 ft 1⅜ in.
Wheel base ..... 42 ft 3 in.
Each truck (rigid) ..... 12 ft 6 in.

Diesel Engine
ONE Model 244 turbosupercharged, 4-cycle, 12-cylinder, 1600-hp to generator for traction.

Dynamic Braking
Capacity 2900-hp

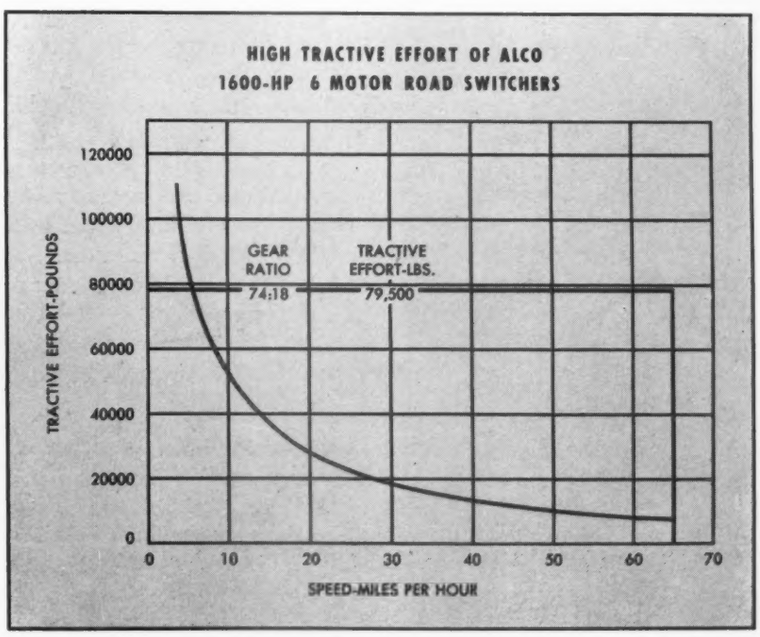
Running Gear
Trucks 3-axle, 6-wheel
Driving motors 6
Wheel diameter ..... 40 in.

Maximum Speed ..... 65 mph

Continuous Tractive Effort for 65 mph gearing ..... 79,500 lb

Traction Motor Gearing
Gear—number of teeth 74
Pinion—number of teeth 18
Ratio 4111

A heavy-duty, all-purpose unit available in a wide range of weights, the Alco 1600-hp 6-motor road switcher is capable of handling a wide variety of tough assignments.



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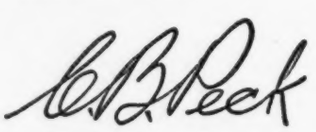
Give Employees a Chance

A significant innovation was reported to the board of directors of the Chesapeake & Ohio at its meeting on November 10. The board was shown a model of the Huntington, W. Va., shops of that road, once a major steam locomotive repair shop, laid out for handling diesel locomotive repairs. The fact that the model of the proposed conversion is the work of a group of shop employees and was presented to the board by representatives from the ranks is not what makes the event significant. It is the fact that the proposed changes in the shop were also developed by the shop employees with the knowledge and blessing of the management.

What has made the physical development of America proceed at such a rapid pace is the tremendous surge of constructive energy which freedom of opportunity has released for the advancement of society at the same time the ambitions of individuals are being advanced. One of the weaknesses of the large corporation which has become characteristic of our present industrial life is its tendency to surround the personnel in the ranks with conditions which are practically prohibitive of the exercise of individual initiative. Obviously any operation in which more than a handful of men are working together would become an anarchy if each individual were free to determine his own working conditions and method of procedure. But loss of all opportunity to exercise initiative leads to indifference on the part of the employees. Their indifference toward their jobs and the ill will which has grown out of it, has been the source of many hindrances to effective production.

The C&O management has taken a bold step toward retapping the great pool of energy and intelligence possessed by the men in the ranks. Whether the substitution of the planning of a shop layout by its employees will be a completely satisfactory substitute for the work of a shop engineer, it will certainly be no more ineffective than the work of an engineer unguided by the knowledge of experience possessed by the men who operate the plant. Developed under guidance, the layout should be satisfactory. It is a dramatic and very promising step in the improvement of employee relations.



EDITORIALS

Too Many Chiefs?

"Not enough Indians" has for a long time been the accepted saying to decribe situations where everybody wants to do the bossing and nobody the working, or situations within companies where there is a surplus of supervisors and executives but a shortage of people to do the routine and production jobs.

How much does the truth of this saying apply to railroad work? Comments made by foremen from time to time would indicate that the reverse is true in railroad shops, particularly those of the car department. These men feel that there are not enough foremen to do an adequate job of supervision. Whereas industry generally may have one foreman to every 15, 20 or 25 men, many railroad car shops have only one for every 25 to 50 men. The supervising task is further increased by the large area over which many railroad foremen's responsibility extends.

It is a puzzle to more than one supervisor why he can —though not without a struggle—get a half-dozen or so workers added to his force upon his recommendation, while at the same time management will turn a deaf ear to a request for a single extra foreman. Why will management accept—at least in part—a supervisor's judgement and grant the funds necessary to put on several extra workers, but will turn the same man down cold when he wants an extra foreman or two? Granting the latter request will usually add less to the payroll, and many supervisors feel that production could be increased more with the existing work force by putting on an additional foreman or two than by adding five or six extra workers. Does not their judgement deserve attention and careful consideration?

Fuel Unlimited

Coal and oil reserves in this country are so great that we are inclined to be pretty smug about where our future power will come from. But in the face of recent disclosures, it would appear we should do a bit of thinking and considerable doing.

The potential energy available in known world sources of fissionable material—uranium and thorium— is now estimated to be 23 times as great as that which is available from known sources of combustible fuel—coal, oil and gas. At the present rate, at which power is being used in the world, this would be enough to last for 9,000 years. Unfortunately for us, the greater part of this supply is not within our territorial boundaries.

At the present time, no economically sound method of producing heat energy from uranium has been developed and under present law, only our government can have a reactor or can own fissionable material such as is required to develop power. Attempts are now being made to modify the law and encourage private industry to participate in and stimulate developments which will make it feasible to derive power from uranium and thorium. We must have know-how if we are going to bargain with countries having large deposits of uranium ore.

Possible effects on railroads are still remote and purely speculative. If stationary nuclear power plants become practicable, they can scarcely be expected to reduce the cost of electric power by more than a few mills per kilowatt-hour. If, in the meantime, prices of oil should rise appreciably, straight electrification might again become more attractive. The initial types of power plants which might use nuclear fuel would probably be those in relatively remote locations where water is not abundant, and the cost of shipping combustible fuel is large. Ships may find nuclear fuel a desirable power source. Railroad locomotives are a possibility, but because of the size of the protective equipment required, they will probably not be an early development. If it does develop, however, that nuclear power plants become practicable, it is possible that the importance of coal as a valuable chemical will be emphasized. The important phase of the situation at the moment is to develop the necessary know-how before someone else does.

NEW BOOKS

MEASUREMENT TECHNIQUES IN MECHANICAL ENGINEERING. *By R. J. Sweeney, consulting engineer. Published by John Wiley & Sons, Inc., 440 Fourth avenue, New York 16. 309 pages, 6 in. by 9¼ in.; cloth bound. Price, $5.50.*

This book, designed to aid students and practicing engineers in development and research work, is a source of information on the measurement techniques commonly used in performance testing such power equipment as engines, pumps, compressors, and combustion and heat-transfer apparatus. It discusses the primary function of measurement and indication instruments and their function as signaling devices to automatic controllers, and provides an insight into the principles on which instruments are designed and an understanding of the pitfalls to be avoided and the difficulties involved in obtaining a correct measurement of physical quantities with the types of instruments available.

INFEED GRINDING LONG BOLTS *in one operation*

The illustration at the right shows a CINCINNATI FILMATIC NO. 3 Centerless set up for grinding long bolts by the infeed method. The complete length of the bolt under the head is ground to size in one operation.

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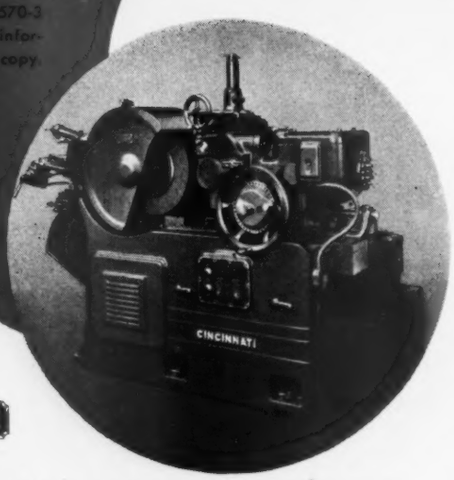

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Write for booklet G-503-2 "Principles of Centerless Grinding," an unusually informative booklet which is written in nontechnical language. This booklet also contains a chapter on small lot production.

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RAILWAY LOCOMOTIVES AND CARS

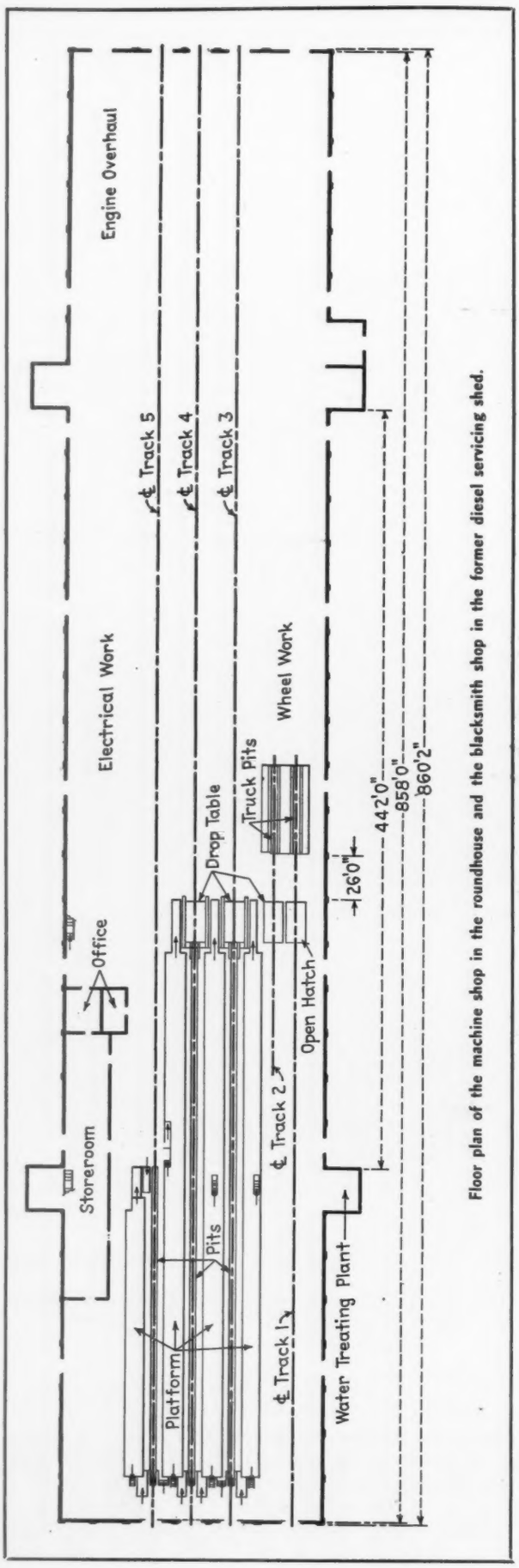
North end of shop. Locomotives are given heavy repairs in the center bay and individual components overhauled in the side bays.

Katy Converts Repair and Servicing Facilities to Diesel Work

Back shop handles servicing at one end, heavy repairs at the other, while roundhouse serves as a job shop for back shop

THE Missouri-Kansas-Texas has converted its extensive steam locomotive facilities at Parsons, Kan., into the system's largest diesel maintenance and servicing point. Included in the conversion were both the back shop and the roundhouse, the latter serving today in the dual role of a job shop for the back shop as well as a repair facility for mechanized maintenance-of-way equipment.

The converted back shop is a building approximately 154 ft. by 860 ft. It was a natural for conversion as it was one of the comparatively few longitudinal steam locomotive shop layouts in this country. The roundhouse originally had 39 100-ft. stalls (two were subse-



Floor plan of the machine shop in the roundhouse and the blacksmith shop in the former diesel servicing shed.

MACHINE TOOLS IN THE PARSONS DIESEL SHOP

Machine	Manufacturer	Operation
Car wheel lathe	Putnam	Turn diesel wheels.
Vertical turret lathe	Bullard	Bore diesel wheels and journal boxes.
Heavy duty grinder	Norton	Grind diesel wheel axles.
Lathe (36-in.)	Betts-Bridgfort	Turn diesel axles.
Heavy duty journal lathe	Shaw-Putnam	Turn diesel axles.
Hydraulic wheel press (200 ton)	Ashton	Press diesel wheels on axle.
Magnaflux machine	Magnaflux	Test axles, pistons, etc.
Lathe (16-in. by 96-in.)	Pratt-Whitney	Make tool dies.
Lathe (16-in. by 96-in.)	LeBlond	General machine work.
Turret lathe	Foster	Make studs, bolts, nuts.
Triple-head threader	Acme	Turn ¾-in. to 2 in. threads.
Grinder	Thompson	Grind machine tools with magnetic tool holder.
Heavy duty radial drill press	Blackman-Hill McKee	Drill miscellaneous large work.
Cylinder grinder (No. 50)	Heald	Grind diesel liners and air compressor cylinders.
Heavy duty power saw	Peerless	Saw steel shafting and tubing.
Grinder (internal)	Micro	Grind air pumps, brake cylinders.
Grinder		Grind carbide tools.
Grinder	Cincinnati	Grinding milling and other machine tools.
Milling Machine (No. 2)	Milwaukee	Cut gears, dies and taps, coach lathe tools and gages.
Precision grinder	Cincinnati	Grind shafting, bushings and taper pins.
Drill grinder	Sellers	Grind power drills.
Heavy duty radial drill press	American	Drill locomotive draw bars and general drilling.
Radial drill press	American	General drilling.
Light drill press	Canedy-Otto	Light drilling.
Heavy duty lathe (23-in.)	LeBlond	General machine work.
Nozzle valve grinder		Grind diesel nozzles.
Fuel pump calibrating machine		Calibrate diesel fuel pumps.
Test rack		Test fuel injector on Alco and Baldwin diesels.
Test rack		Test fuel injectors on Electro-Motive diesels.
Lapping machine		Lap Alco and Baldwin fuel injector nozzles.

quently lengthened) spread over a 210-deg. arc; all stalls had pits, most of which were 75 ft. long.

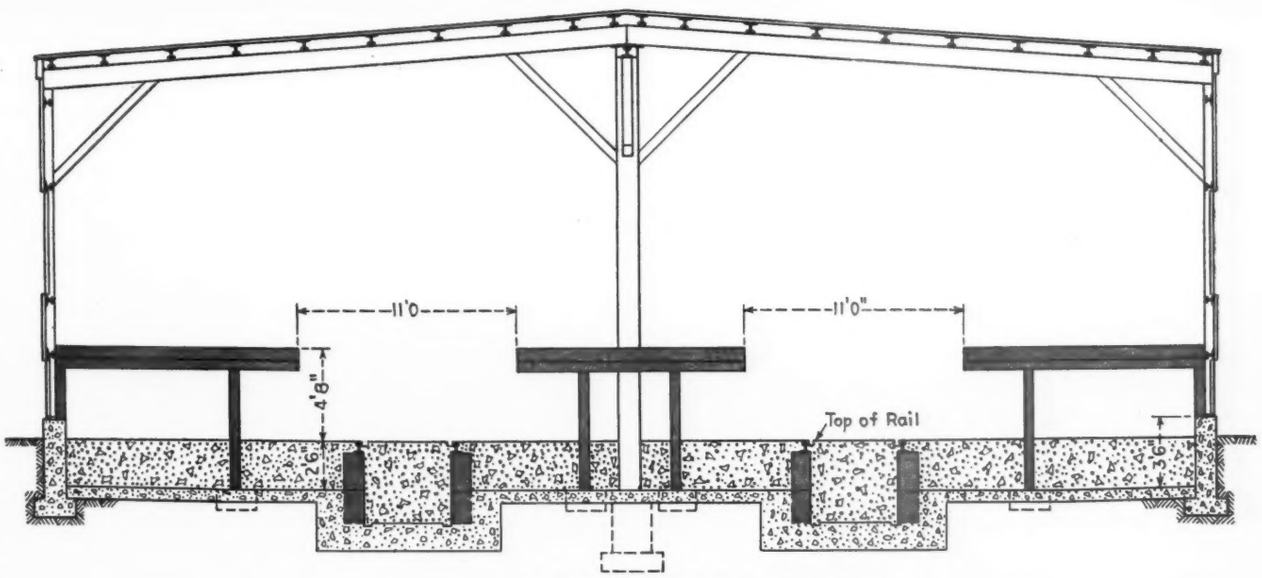
The shop today as converted normally turns out four classified repairs per month. It has 110 units assigned for maintenance, and it services an average of about 60 units a day. The heavy repairs are given to locomotives on the following basis: Every two years on freight power (300,000 miles); every two years on passenger power (600,000 miles); every two years on road switchers and every four years on yard switchers.

Interference Avoided in Conversion

The changeover from steam to diesel handling at Parsons was a systematic program which carefully coordinated successive modifications to the roundhouse and the back shop. The first modification was made to the roundhouse following the assignment of 21 diesel freight units to Parsons for maintenance. The change comprised the addition of an extension 81½ ft. long by 58 ft. wide beyond stalls 36 and 37, and the lengthening of pits 36 and 37 to 160 ft. The servicing area was of conventional arrangement with the rails elevated 2½ ft. above the shop floor, a platform between the two stalls, and a platform on the outside of each stall.

Before these 21 diesels arrived, the Parsons back shop turned out an average of twelve classified repairs on steam power a month. The 21 units reduced class repair needs to seven; 20 more diesel units reduced steam classified repair needs to three per month.

With this 75 per cent reduction in the volume of steam locomotive classified repair work, space was available and the time was ripe to move diesel servicing and



Cross-section through diesel repair stall at Parsons shop.

maintenance into the main shop. Diesels were handled on one track at the south end of the shop and steam locomotive work was concentrated at the north end. Conflict between the two types of repair work was avoided by this division, while conflict between diesel repair work and the installation of improvements was avoided by orderly selection and changing of servicing tracks.

Diesels were first serviced within the backshop building on Track 5 (the west track). No platforms had been installed nor had any pits been dug. These improvements were first installed on Track 3. By following this procedure the pits and platforms could be added to Track 3 without interfering with diesel work on Track 5, and, at the same time, Track 4, the center track, could be used for handling the concrete and materials into the area and for removing earth from the area. When the facilities at Track 3 were completed, servicing and maintenance work was moved to that track while facilities were being installed on Track 4. This again avoided interference with the routine maintenance work, and it left Track 5 free to handle materials in and out.

The facilities installed on Tracks 3 and 4 comprised three cantilever platforms and two pits, all about 280 ft. long, with the center platform serving both tracks. Track 5 has a short pit and platform (160 ft. long), both of which can be lengthened if future conditions make it necessary. The platforms installed were those removed from stalls 36 and 37 in the roundhouse when diesel servicing was transferred to the back shop.

Functional Guard Rail Design

An interesting feature of the platforms is the design of the guard rails. These are telescoping so that they may be opened at any point for access to the locomotive doors regardless of the make of the unit or the distances between doors of coupled units. The rails are made from three different sizes of steam locomotive flues. When the pit is empty these are secured in place by locking pins suspended by chains from the posts. When the pit is occupied, the rail flues collapse into one another. An opening directly opposite the door is thus provided.

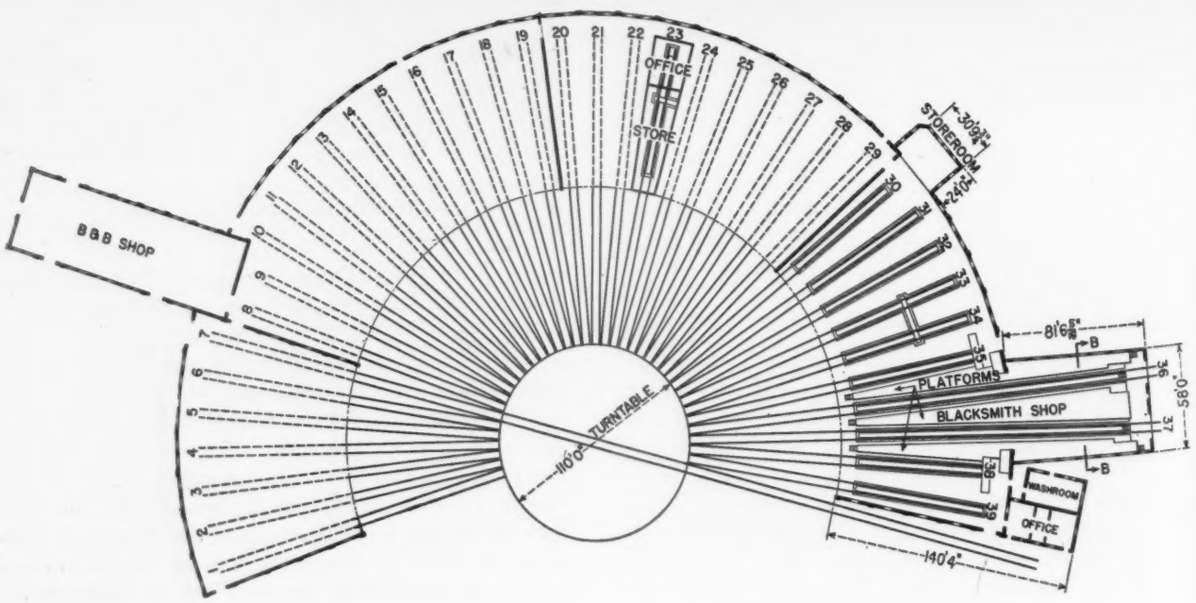
Accurate spotting is not necessary for truck changeout as the body supports roll on the dolly tracks into place under the jacking pads

While the platforms and pits were being added to Tracks 3 and 4, a Whiting drop pit capable of handling six-wheel trucks was installed at the north ends of these tracks. It has two escape tracks east of Track 3 which lead to truck repair pits. The drop tables at the ends of Tracks 3 and 4 have dolly rails on each side along which the locomotive body supports travel on four wheels. This avoids the need for spotting the locomotive with the jacking pad directly over the support to drop a truck. Instead, the locomotive can be stopped with the truck approximately at the center of the table, and the

All car and locomotive air-brake work for the Katy system is done in a balcony along one entire side of the shop.

Two styles of platforms are used when repairing engines. Each is at a comfortable working height and has a shelf for tools and parts.

Location of facilties in MKT Parsons enginehouse.



support moved into place under the jacking pads. While six-wheel trucks still have to be spotted within a few inches of the center of the table because of the small difference between the table length and the overall length of the truck, there is substantial leeway for spotting four-wheel trucks.

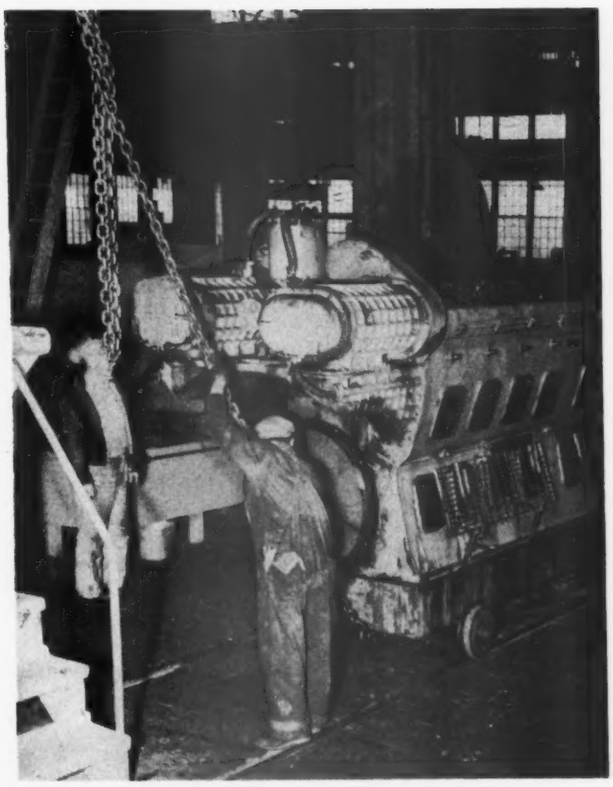
During this period when both steam and diesel power was repaired at Parsons, the diesel work was largely confined to the south third of the building. Exceptions to this general rule included wheel work done in the east center of the shop, heavy electrical equipment overhaul in the electric shop in the west center, and some work on heavy engine parts, such as polishing crank shaft throws, in the northwest corner.

As the steam work continued to decline, and the diesel repair requirements continued to increase with the acquisition of more units, areas were set aside for overhauling major components in the north end of the building.

Present Division of Work

Today with the shop devoted exclusively to the maintenance of diesel power, all running repairs are handled south of the drop pit, heavy repairs north of the drop pit. Locomotives coming in for heavy repairs enter from the north, those for servicing from the south. Locomotives due for heavy repair work normally are placed on Track 3 or 4, although any one of the three through tracks can be used.

One of the features of this shop is that everything is under one roof, including storage facilities in an area set aside in the southwest corner. Part of this will be enclosed by a cyclone fence for storing heavy materials on pallets. Smaller materials will be stored in a room adjacent to the fenced-in area. The area enclosed by the fence will have wide aisles to permit complete freedom of movement within it by fork lift trucks. The diesel foreman's office and the stores office are together between this storage area and the repair area of the shop.



Engines are removed and loaded on a dolly by the 60-ton traveling crane. A second crane pulls them into the engine repair area.

Complete repairs are made to smaller motors and generators. Major work on traction motors and main generators is by unit exchange.

Roundhouse Plays Important Role

Rather than dismantle a usable structure, the Katy converted the 39-stall roundhouse at Parsons partially

SHOP EQUIPMENT IN THE PARSONS ENGINEHOUSE

Machine	Manufacturer
Hydraulic press	Chambersburg
Radial drill press (60-in.)	American
Engine lathe (36-in.)	Niles Bement Pond
Double end tool grinder	Hesey
Lathe (18-in. by 60-in.)	Lodge and Shipley
Lathe (20-in. by 96-in.)	Lehman
Universal turret lathe (No. 1A)	Warner & Swasey
Planer (36-in. by 36-in. by 120-in.)	Niles Bement Pond
Tool grinder (3-in. by 18-in.)	U. S. Electric Tool
Triple-head threader	Landis
Circular renewable-tooth cut off saw	Espen Lucas Mfg. Co.
Vertical drill press (36-in.)	Cincinnati
Shaper (32-in.)	Cincinnati
Univresal Milling Machine (No. 4)	Cincinnati
Vertical drill press (18-in.)	
Flanger (1-in. capacity)	McCabe
Vertical turret lathe (34-in.)	Bullard
Boring mill (48-in.)	Cincinnati
Punch and shear (½-in. capacity plate, 13/16-in. capacity punch)	Long & Alstatter
Capacity plate bending rollers (¾-in.)	
Multiple head punch (No. 8)	Beatty
Draw cut shaper (40-in.)	Norton
Boring mill (102-in.)	Niles
Universal pipe threader (⅛-in. to 2½-in.)	
Barstock shear (capacity 2-in. round)	Cleveland
Forging machine (2-in. capacity)	Ajax
Steam hammer (1,100-lb. capacity)	
Steam hammer (2,500-lb. capacity)	Chambersburg
Stationary forging machine	
Portable forging machine	
Forging furnaces with independent air supply (2)	
Forging furnaces, shop air supply (4)	
Fan blast blower (No. 10)	
Annealing furnace (5-ft. by 5-ft. by 10-ft.)	
Heating furnace (2-ft. by 5-ft. by 5-ft.)	
Heating furnace (2-ft. by 3-ft. by 5-ft.)	
Heat treating unit consisting of:—	
Electric tempering vat	
Electric heating furnace	
Gas heating furnace	
Gas salt bath tempering furnace	
Flanging clamp (7-in. by 84-in.)	
Gas fired furnace (55-in. square)	
Various sized face plates (5)	

Some of the six stalls in the roundhouse where the pits were concreted over and the area converted to a machine shop.

The roundhouse diesel servicing shed was converted to a blacksmith shop by filling in pits and movng platforms to the main shop.

for use as an adjunct to the diesel shop and partially for maintenance work of other departments. Six stall (34-39) were converted to a machine shop, which operates as a job shop for the diesel back shop at Parsons and for other diesel and car shops on the railroad. The extension that was originally built onto the middle two stalls of this six-stall section for diesel servicing has been converted to a blacksmith shop. Both shops are well equipped with machinery as shown in one of the tables.

The pits in the blacksmith shop, as well as those in the machine shop, were filled in and the floors concreted. The elevated rails and the platforms used for handling the diesels when they were serviced in this extension were moved to the main diesel shop and re-installed. The frames for the forge shop were made from old rails and centersills.

The next four stalls (30-33) were converted to a boiler and tin shop. Small parts are stored in a small extension approximately 24 ft. by 30 ft. adjacent to the boiler and tin shop. Stalls 20-29 are devoted to repairing small items of mechanized maintenance of way equipment, such as track gang cars, inspector's cars, etc. One stall (23) in this area is enclosed for an office and a M of W storeroom.

The ten stalls beyond the motor car shop will be used for storing these vehicles while awaiting repair or upon

completion of repairs. This large amount of space was set aside because these repairs are largely concentrated in the winter months and the repaired units stored until spring. Weed burners also repaired here.

The remaining stalls (1-9) will be used for repairing heavy items of roadway equipment, such as locomotive cranes. An extension 113 ft. long and 49 ft. wide beyond stalls 8 and 9, which was formerly the roundhouse machine shop, has been turned over to the bridge and building department.

Trucks Repaired in Diesel Shop

The two escape tracks for the drop pit in the main diesel shop extend in both directions from the point at which the truck is received. The easternmost of these two tracks (Track 1) extends out the south end of the shop. The south end of the other track is a stub track, as are the north ends of both tracks. In general the area south of the drop table is used for truck storage; the area north of the table has truck pits to facilitate repairs. The pits are 30 in. deep, 26 ft. 9 in. wide and 50 ft. long.

When a truck is removed from a locomotive on Track 3 or 4, the usual procedure is to move it by the drop table and release it on Track 2. It is torn down on Track 2, moved by the overhead traveling crane to Track 1, rebuilt on Track 1, and then rolled down to the section of Track 1 south of the drop table for storage. When ready for use it is then rolled to the drop table and delivered to one of the two locomotive servicing tracks.

The truck parts are cleaned in a lye vat south of the shop. The cleaning is done with a single handling by the overhead crane which extends out the south end of the building. Box work is done immediately adjacent to the pit, the traction motor sent to the electric shop directly across the building from the wheel shop, and the wheels and axles reworked as necessary in the wheel repair wheel shop section just north of the escape tracks.

The trucks are overhauled in eight basic steps, as follows:

1. Remove traction motor support bearings.
2. Lift motor off axles and move to electric shop.
3. Remove frames and boxes and place in lye vat.
4. New wheels and boxes are readied while the frame is in the lye vat.
5. New or reconditioned pedestals and liners and new or reconditioned wheels and boxes are applied to the cleaned truck frame.
6. Apply the traction motors.
7. Apply support bearings.
8. Apply brake rigging, etc.

The complete truck overhaul requires an average of eight hours for four men. Roller bearings are always reworked each time a truck is dismantled, and the trucks are rebuilt right side up. Wheels are handled in a small wheel shop area north of the truck repair section. This section has a wheel lathe, a boring mill, an axle grinder, two axle lathes, a magnaflux machine and a 200-ton wheel press. Normal output is 125 pairs of diesel wheels per month, but this can be increased if needed.

Commutator Stoning Done First

The first thing done to a locomotive coming in for heavy repairs is to stone commutator of the main generator while in place, using the diesel engine to turn the generator. The stoning is done on the night shift because all Katy diesels are removed from service in the evening.

The following morning the diesel engine is removed by a 60-ton traveling crane and placed on dollies which run on a narrow gage track that leads to the engine overhaul room. Here the engine is stripped, put on a revolving jig to remove the crankshaft, and the crankshaft put on a second jig to polish the throws. Upon completion of repairs the engine is again placed on the dolly, rolled into the main shop and lifted in place with the overhead crane. Parts reconditioning and filter and parts cleaning rooms are located near the engine overhaul shop.

Cold Solution Cleans A-Frame

The Katy has developed a procedure for cleaning the A-frame and the oil pan without removing the paint. These parts are placed in a cold (about 120 deg.) bath of Turco Mulsirex, which is used for cleaning all interior paint surfaces. The A-frame and oil pan are left in this solution overnight and washed off with hot water the next morning. The process is cheaper and faster than hand cleaning and it does not remove the paint as hot solutions do.

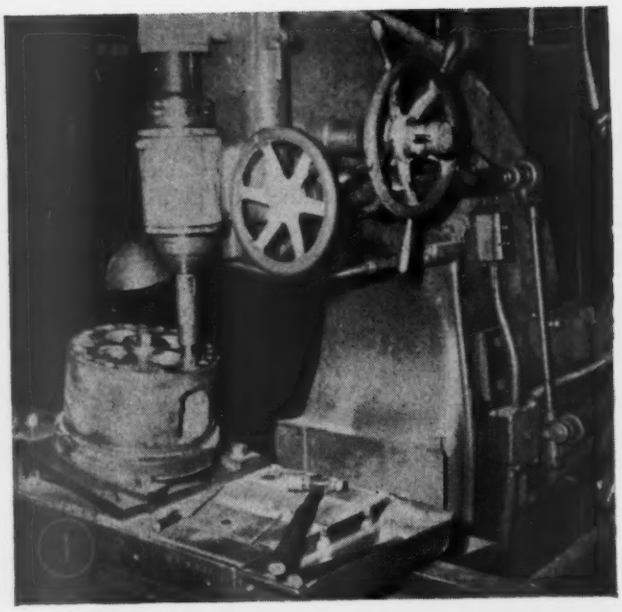
All locomotives going through the shop are currently benig modified by the addition of a pan under the engine developed by the Katy to catch the oil drip. The oil caught by the pan is piped to the side of the locomotive where it is discharged outside the rails. The pan serves to keep oil off the fuel tank and out of the inside of the locomotive, and it also serves to keep leaves, dirt and other refuse from accumulating under the diesel engine.

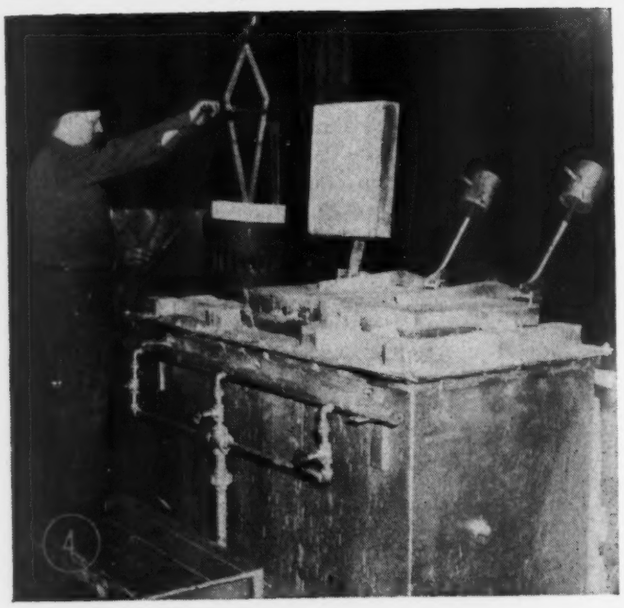
Traction motors and main generators are cleaned by corn-cob blast, with the corn ground to about the fineness of corn meal and blasted at 90-lb. air pressure in a special housing. Its principal purpose is to clean the field coils and the armatures before painting. Other work done on traction motors and main generators includes complete cleaning and painting of main generators and traction motors, new bearings throughout, stoning of commutators, and reworking brushes and holders.

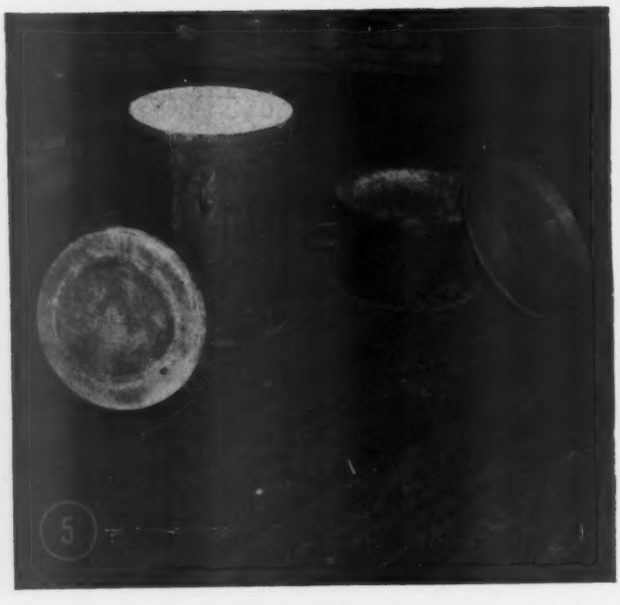
Power contactors, reversers, cam switches, auxiliary generators, and traction motor blowers are all completely overhauled. Armatures are rewound on motors and generators on all but the largest sizes. Unit exchange is used when main generator or traction motor armatures require rewinding.

Cylinder liners are finished to two oversizes. This is normally done on a Micro-grinder rather than a honing machine. Oil filters and lubricating oil are changed on the basis of test results only; no mileage limits are set.

While engines, main generators, air compressors, steam generators, etc., are removed from the body from the locomotive, the body is set on a wash rack where the entire underneath is washed with a steam gun. A complete overhaul requires an average of seven working days at Parsons including the complete painting of the inside and outside of the locomotive and by program work, such as the addition of the drip pan under the engine and adding three extra body filters to F7 locomotives so that main generator air can be brought inside directly without having to pass over the engine and become saturated with oil vapors.







Over 6,000 Cylinder Heads Reclaimed by Welding

THIS article is an abstract of a committee report of the Master Boiler Makers' Association presented on Tuesday, September 15, 1953 at the association's annual meeting at Chicago.

The electric arc and oxygen-acetylene welding methods are the two older and more familiar processes that are indispensable in the maintenance of the steam and diesel locomotives. However, the inert gas shielded arc process known as the Heliarc or Heliweld methods are also being used. The inert shielded arc with consumable electrode is used to a great extent on automatic welding of aluminum ring groves, cracked aluminum pistons, etc. Some railroads are using the inert gas shielded arc process with nonconsumable electrodes for welding cast iron diesel locomotive cylinder heads, aluminum, stainless, monel and carbon steel parts.

With the present use of molybdenum wire, metal spraying has been found to be very economical, and a very successful means of repair for many diesel locomotive parts. Satisfactory results have been obtained in considerable instances on air compressor shafts, armature shafts, transition motor shafts and water pump shafts by means of metal spraying.

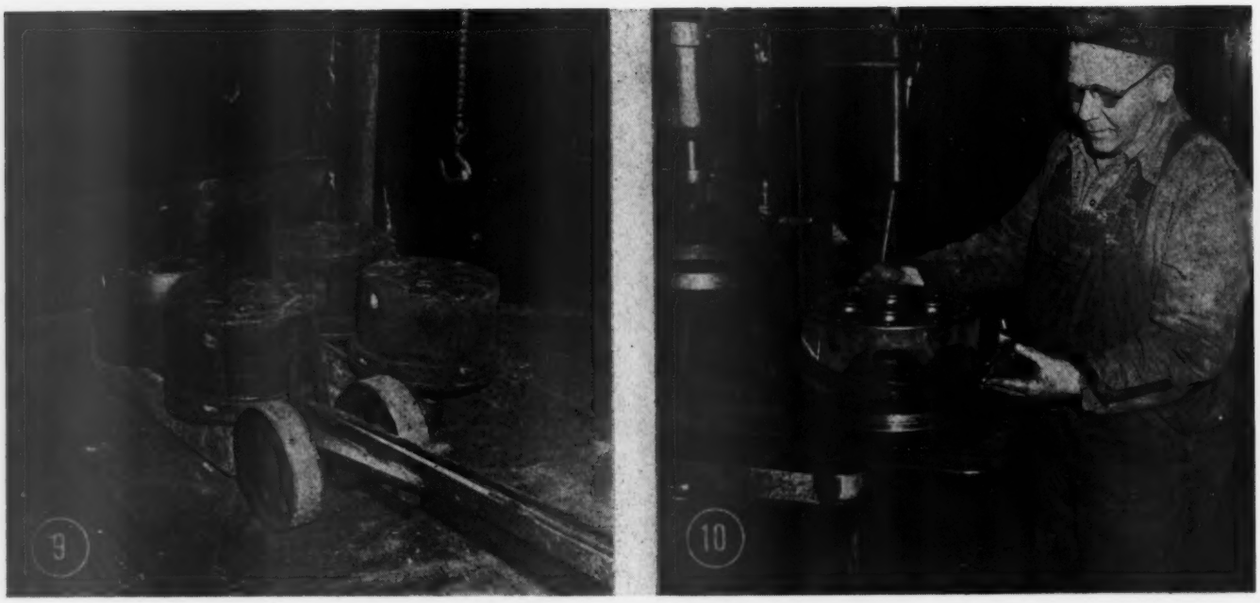
The many operations involved in reclaiming diesel-engine-cylinder heads by welding are pictured in 22 steps on these and the following pages. The first three on the opposite page show some of the preparatory steps in changing the water channel. The other three show some of the equipment used in the welding oparation. The two illustrations at the top of this page show, respectively, a welded head in the heat-retaining box and a head after the water channels have been built in solid.

It is a known fact, that welding, and its allied processes, are playing an important part in diesel locomotive maintenance. There are varied welding operations required in diesel maintenance, some of which present problems to even the most experienced and skilled welder.

Due to the percentage of breakage, hard surfacing on cylinder head valves has been discontinued by some of our railroads. However, this problem is being studied, and an answer can be expected in the near future.

There are two designs of cylinder heads and three designs of cylinder liners now being used on General Motors diesel engines; the old head being identified as design No. 1 and the improved head as design No. 2. The design No. 1 heads have cored-out round and elongated or oval water channels while the design No. 2 heads have drilled water channels.

The cylinder liners are identified as design No. 1, design No. 2 and design No. 3. The design No. 1 liner has cored-out elongated or oval water channels the same as design No. 1 cylinder head. The design No. 3 cylinder liner has twelve drilled water channels which are counterbored to accommodate water tubes and grommet type water seals. The design No. 2 cylinder liner has twelve drilled water channels the same as No. 3. However, it is not counter-bored so water tubes and grommets can be used.



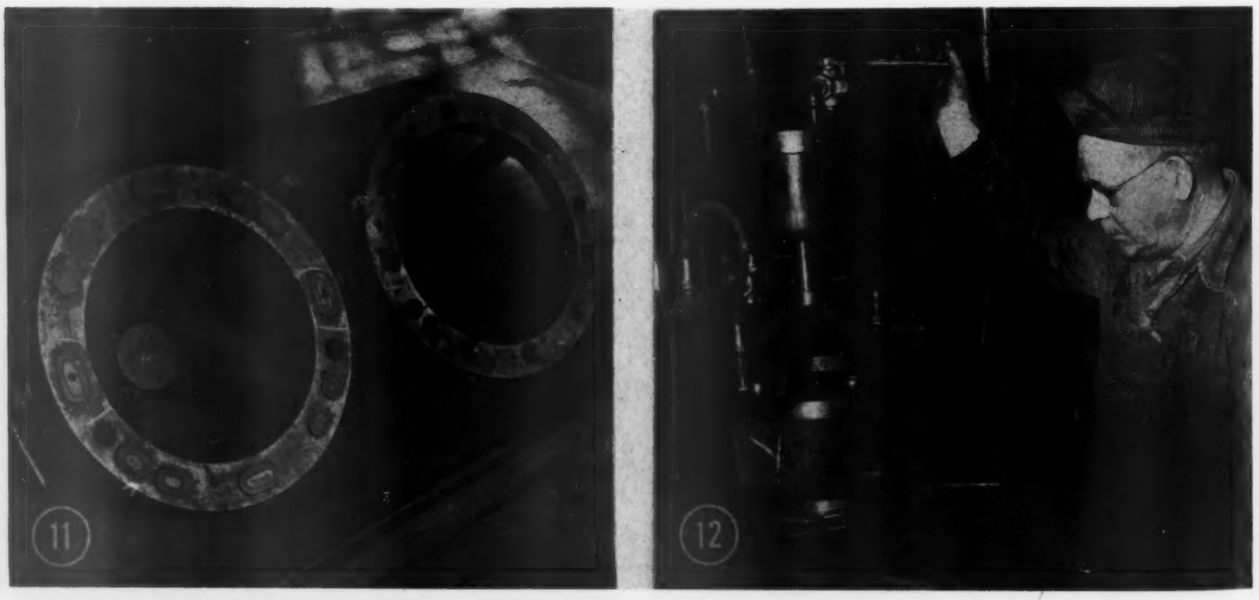
After the welded heads have been removed from the annealing furnace and machined, they are tested.

Either the design No. 1 or design No. 2 cylinder heads can be applied to design No. 1 and design No. 2 cylinder liners, provided a sandwich type copper asbestos steel gasket is used. A shim type copper gasket must be used with the improved No. 3 design cylinder liner and design No. 2 cylinder head because the No. 3 liner is $\frac{1}{16}$ in. longer than the design No. 1 and No. 2 liners.

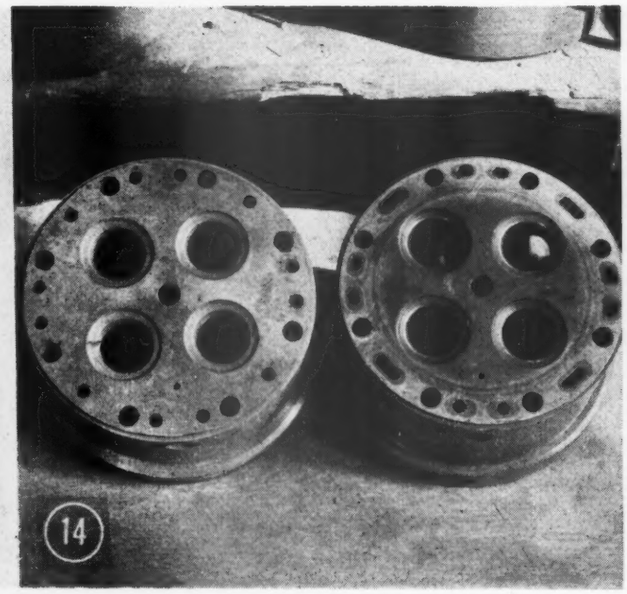
A large midwestern railroad is now in the midst of an extensive program of converting the design No. 1 cylinder heads to the design No. 2 type which makes them adaptable for use with the new improved design No. 3 cylinder liners. Up to the present time this railroad has successfully reclaimed over 6000 cylinder heads. This program also includes converting the design No. 1 liners to the new improved design No. 3 type. This conversion program makes them available for use with the No. 2 heads, utilizing the improved shim type copper gasket.

The conversion of the design No. 1 heads is accomplished by building the cored-out round and elongated or oval water channels in solid and drilling new round channels to conform to the channels in the design No. 2 heads. The cored-out elongated or oval channels in the design No. 1 cylinder liners are also built in solid in the same manner and drilled and counter-bored to conform to the channels in the design No. 3 liners. In addition, the head contact surface of the liners is built up so that they can be machined to the standard length of the new improved design No. 3 liner, thus making them all interchangeable and adapted to the use of the improved shim type gaskets.

In converting the design No. 1 heads, they are first tested for leakage, then the elongated and oval water



The testing spiders on the bench and in the process of being used.



When machining is completed, the valve seats are ground. New water channel design in a head is seen at the right.

channels are milled out to an angle of approximately 30 degrees, on the inside edge only, to provide for welding clearance. A small shoulder should be left around the bottom of the openings to support a thin cast iron insert of suitable shape which in turn will support the molten cast iron alloy rod during the start of the welding operation. Any cracks or checks around the valve seats, injector hole or on the face of the heads should also be milled out to an included angle of from 40 to 60 degrees to provide welding clearance.

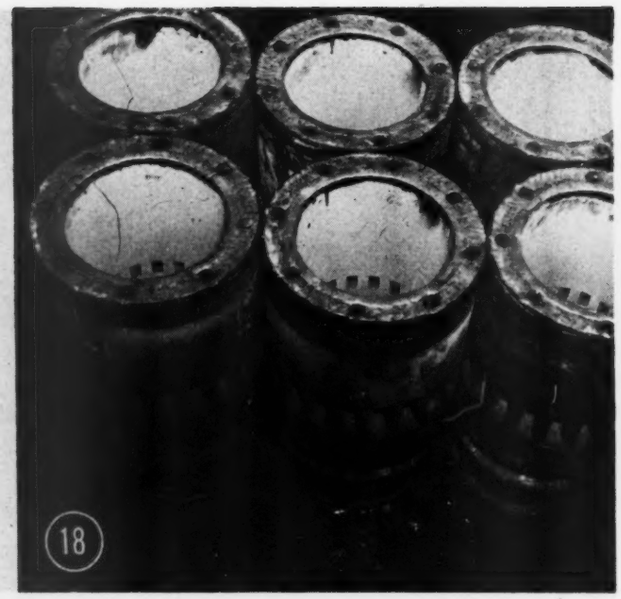
Figure 1 shows clearly the method of machining the welding clearance in the water channels on a vertical mill; note that the head is clamped in an angular position so that the clearance is milled primarily on the inside edge of the openings.

Figure 2 shows a head with the water channels and valve seat sections prepared for welding and in the process of having a crack running from the injector hole milled out.

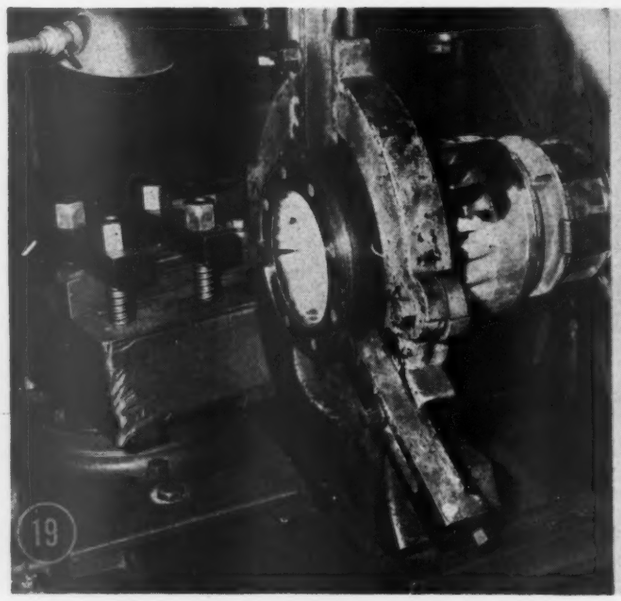
Figure 3 shows five design No. 1 heads with the water channels machined to provide welding clearance, the valve seats machined for building up, the injector hole reamed out for building in solid and cracks in various locations milled out for welding.

Figure 4 shows the furnace used for preheating cylinder heads and liners prior to the performance of the welding operations. The cylinder heads are preheated to a temperature of 900° F., in approximately 45 minutes. This furnace will handle three heads or three liners at one time, thus eliminating any delay of the welding operations as preheated heads or liners are continuously available for welding. Either gas or oil may be used satisfactorily,

How the liners are prepared for water channel welding.



Head contact surfaces in process of being built up and after completion.



One of the liners being machined and a group of completed ones.

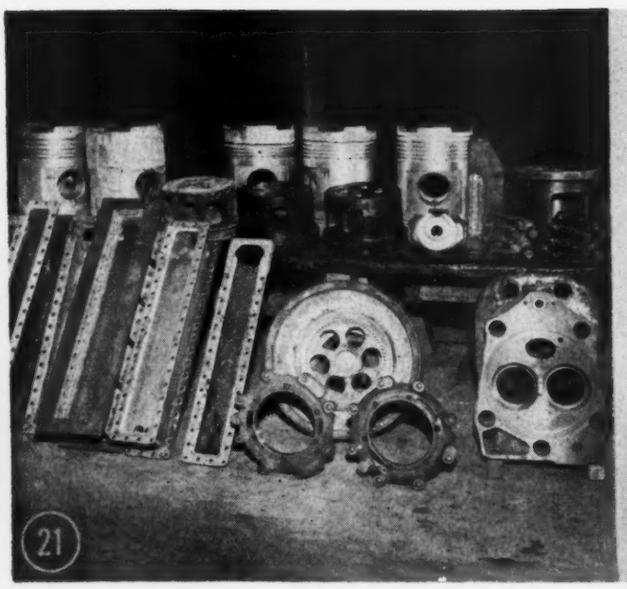
the fuel depending on the furnace and the burner design, etc. Gas is used in the furnace shown. The furnace is top opening and the insulated covers or doors are counterbalanced to facilitate operation.

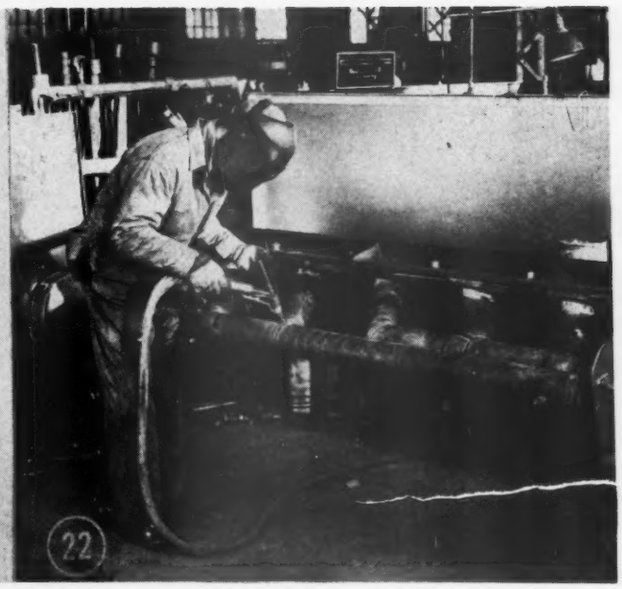
Figure 5 shows the insulated heat retaining boxes in which the heads and liners are contained during the welding operation. After the welding is completed, the heads or liners are allowed to remain in the boxes over night with the closely fitting insulated lids or covers in place. The boxes and lids are fabricated from steel plate and lined with approximately two in. of asbestos. As will be noted, loops or eyes are provided on both sides of the boxes to facilitate handling.

After cooling in the heat retaining boxes over night, the heads are placed, nine at a time, in a suitable furnace and annealed by heating to a temperature of 1,350 deg F. and holding at that temperature for one hour. The burners are then shut off and the heads left in the closed furnace over night.

Figure 6 shows a preheated head in the process of being welded in one of the heat retaining boxes. The stand on which the boxes set is pivoted on suitable ball bearings so that it can be easily revolved. The circular metal-bound asbestos cover has a small circular opening in the center so that the welding can be performed in a small section at a time without exposing the entire surface of the head to the cooling action of the atmosphere.

The cylinder head shown in *Figure 6* is being welded with an inert atmosphere shielded nonconsumable electrode torch. A.C. current at 175 amps and $\frac{3}{16}$ in. tungsten electrode is used. The organ flow is 1pm. The welding rod being used is a cast iron alloy. Additional





Many parts, such as radiator headers, spacers and exhaust manifolds, can be reclaimed by welding.

data covering the reclamation and conversion of diesel cylinder heads can be obtained from the manufacturers of the welding equipment.

Figure 7 shows a welded head in heat retaining box.

Figure 8 shows a head after the water channels have been built in solid and a crack welded between a valve seat and the injector hole.

Figure 9 shows four welded heads after they have been removed from the annealing furnace.

Figure 10 shows a welded and machined cylinder head on the test stand being prepared for final test. The testing mechanic is applying a sealing band over the three water channels which are located near the bottom of the head as it sets on the test stand. The testing spider is shown in the left background. The sealing band is made from strip steel with rubber or similar pads so located that they will seal the three water ports when the band is clamped in place. A new method of hardening valve seats in cast iron heads has recently been developed on a class 1, mid-western railroad. Flame hardening is used by oscillating 12 small special made tips for oxy-acetylene flames across the valve seat, after machining is completed and before final grinding. It is found that the service life is greatly extended by this process.

Figure 11 shows the testing spiders or heads used on the seat surface of both the cylinder heads and the cylinder liners.

Figure 12 shows a head in the process of being tested. As will be noted, the sealing ring is clamped over the three ports or channels and the spider or head is held in position by the pressure of an air cylinder which is a part of the test rack assembly. The cavities in the head are first filled with water at the shop line pressure, after which air at approximately 90 lb. pressure is applied. The test rack assembly, including the heads or spiders, etc., are fabricated from miscellaneous parts usually available around locomotive shops.

Figure 13 shows a welded and machined head in the process of having the valve seats ground on a special jig designed for this purpose.

Figure 14 shows a design No. 1 head with the elongated and oval water channels and a head of the same design that has been converted to a head of the design No. 2 type.

Before the heads are placed in service they are thoroughly cleaned and polished as may be required to remove any surface effects of the preheating, welding, etc. This includes the reaming or cleaning out of the stud holes, the smoothing up of the top surface, the valve stem guides, etc.

The design No. 1 cylinder liners are converted to the design No. 3 type by building the cored-out elongated or oval water channels in solid with oxweld No. 31-T bronze and drilling new round channels to conform to the round channels in the design No. 3 liners. The channels are also counter-bored to accommodate the water tubes and rubber or composition sealing grommets which are used with the design No. 3 liners and the design No. 2 heads in addition, the head contact surface is built up with oxweld No. 31-T bronze to allow stock for machining the liner to the standard length of the design No. 3 type which, as previously mentioned, is $\frac{1}{16}$ in. longer than the design No. 1 and design No. 2 types.

The design No. 2 type liner can be converted to the design No. 3 type by building up the head contact surface with No. 28 or No. 31-T or equivalent bronze rod, machining it to the standard length of design No. 3 liner and counter-boring the round channels to accommodate the water and grommet type water seals.

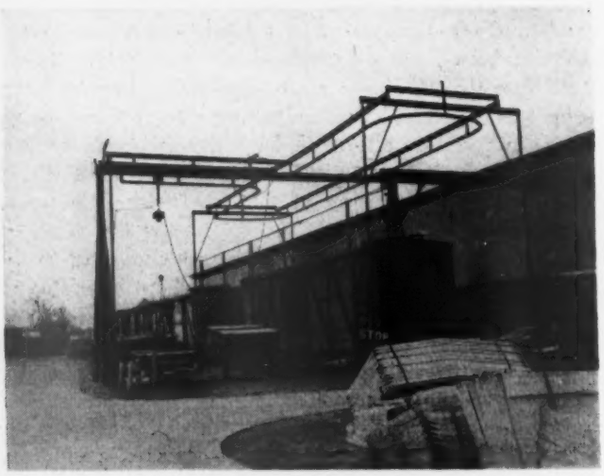
The elongated or oval water channels in the design No. 1 liners are milled out for welding clearance by the same procedure outlined for the preparation of design No. 1 cylinder heads, however, a thin steel insert of suitable shape is applied in the bottom of the openings to support the molten bronze during the start of the welding operation, instead of a cast iron insert as indicated for the heads.

Figure 15 shows clearly the manner in which the channels are prepared for welding.

Figure 16 shows a liner with the required carbon plugs

(*Continued on page 60*)

Missouri Pacific Box-Car Repair Program

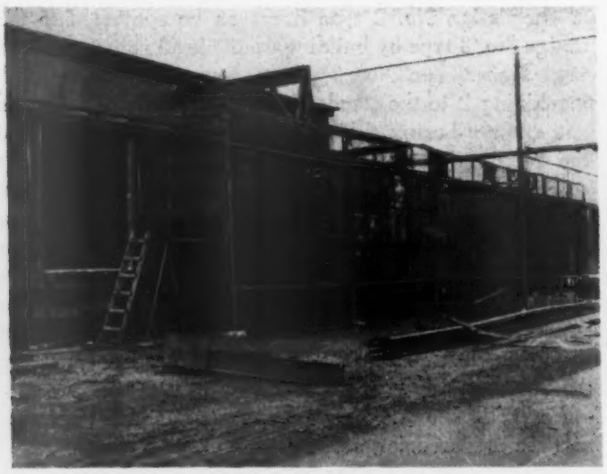


Car ends (top left) are straightened before the sides are removed. Doors are removed with a circle crane (above). A similar crane is used indoors to hang new doors.

THE Missouri Pacific has given heavy repairs to 850 box cars in its DeSoto, Mo., shops at the rate of 18 cars a day. The cars involved are single-sheathed 40-ton box cars with a 40½-ft. inside length, built about 1926. The work is done on an outdoor stripping track and three assembly tracks. The latter are under roof for most of the assembly operations.

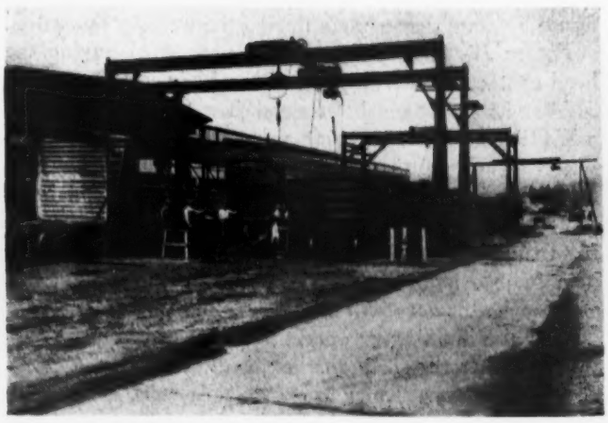
The outdoor trackage is so arranged that a car can be switched out of the production line to go through all or a portion of it a second time. The purpose of this arrangement is to avoid delay to the entire line when extra-heavy repairs are found to be necessary on one car. The car can spend the allotted time between moves at each spot and if all the work scheduled for one of the spots cannot be completed in the time allowed, the car is switched back into the line to go through that spot a second time.

Stripping is done at three principal locations on one track. Between the south end of this track and the center



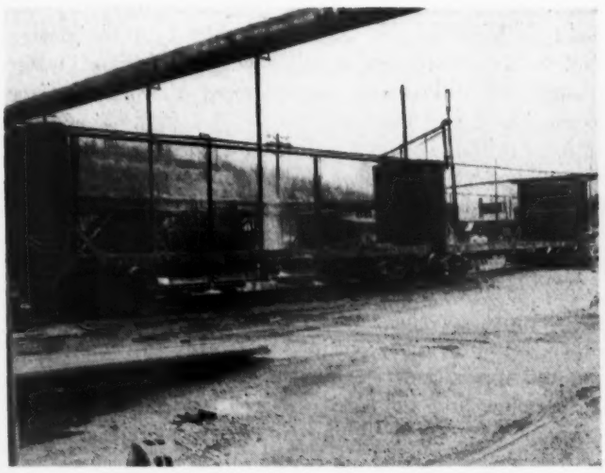
The rivets are cut out with pneumatic hammers in this area which is screened in for a little over two car lengths

The location for removal of the superstructure and the roofs, sections of which are slid directly into the gondola by the chute



The roof purlines are handled directly into the trap car by an outdoor traveling crane

As a car emerges from the south end of the building most of the major riveting work that has been completed.



All the superstructure, except the good steel ends is removed from the car.

The Z-bars formerly used as diagonal side braces are welded to their brackets on a jig for use as longitudinal floor supports

runway there are four cars from which all debris is cleaned out of the interior, and the end lining, sub-floor and doors removed.

Five cars are in the second location, which is between the runway and a point opposite the other (north) end of the building. The first operation in this location is straightening the ends; this is done before the sides are removed so that the sides will hold the corner posts straight while the ends are being straightened. After the steel ends are straightened the bolts are cut out with an air hammer and the sides removed.

The third stripping location is beyond the north end of the building on the same track and contains eight cars. The decking is removed after sprinkling to lay the dust. The roof and all the superstructure is removed and the cars proceed to the north end of the line where they are sand blasted.

Assembly Positions

After the cars are sand-blasted they are switched over to another track, and into the truck shop where draft gears are removed and inspected, couplers removed. trucks removed, completely overhauled and reapplied to the same car.

The first assembly location on this latter track inside

These safety horses that support the car for rolling out the trucks slide out of the way on the greased runways by pulling the lever

the shed contains four cars between the north runway and the center runway. Work done here includes a general inspection of the car, patching or replacing side sills, straightening bent parts ,relocating the hand brakes, and hanging the sides and tack welding them in place.

The second assembly location is between the center runway and the south end of the building and contains four cars. In the first position of this location, scaffolds are placed inside the car, safety appliances tack-welded in place for later riveting, the roofs applied and all holes for the roofs and sides reamed. At the remaining three positions the men drive all rivets which can be reached easiest from the scaffold.

The cars are moved out of the bulding where they receive a prime coat of paint and Insulmat. They re-enter the shop on Track 4 heading north.

The first location on Track 4 contains six cars between the south end of the shop and the center runway. The adjacent ends of the cars in the first two positions are raised and set on steel blocks, and the trucks moved out of the way to drive the rivets for the center plates, draft gear lugs, and the truck and body side bearings. Between Positions 3 and 4, again on adjacent ends, the draft gears are applied, the draft gear carriers riveted, and the trucks put back under the car. In positions 5 and 6 the remaining body rivets are driven, the floor stringers tacked in place, and the wooden deck fillers around the sides are applied. The floor stringers were assembled to their brackets in a jig alongside of Positions 5 and 6.

Four cars occupy the location between the runway and the north end of the building where floor stringers are riveted in place, the deck applied and bolted, remaining safety appliances applied, and the boxes packed. This completes the principal steel work on the cars.

The cars are moved out of the building on Track 4 and switched over to Track 1 to enter the building from the north end. Between here and the center runway are four cars to which are applied the metal running boards and the wooden lining fillers. The side lining is also loaded in this location and nailed in place.

Between the runway and the south end there are three cars. Doors are hung, door track rivets driven, end linings applied and the floors sanded. After leaving the shop the cars are painted, weighed and stenciled outdoors and the final inspection made on the shipping track. A pit outside the shop 4½ ft. deep is utilized for spraying the underframe.

Cylinder Heads Reclaimed by Welding

(*Continued from page 57*)

in place in the stud holes, the steel plates in the bottom of the milled out channels and the outside machined surface covered with asbestos to protect this surface from scaling or damage. The asbestos strips are held in place with wire bands. Tongs for handling are shown setting inside the liner.

After the liners are prepared as shown in figure 16 they are preheated in the furnace shown in figure 4 to approximately 900° F., then removed from the furnace and placed in the insulated heat retaining boxes shown in figure 5 where they remain during the welding operation.

Figure 17 shows a liner in the process of having the head contact surface built up with a ¼ in. No. 28 or No. 31-T or its equivalent bronze rod. The torch can beeither a W42R or a No. 750, using either a No. 30 tip with the W24R or a No. 6 tip with the No. 750. The water channels are built in solid prior to the building up of the head contact surface. The carbon inserts keep the bronze from running over into the stud holes. The pick up end of a fume exhausting unit is shown in position on top of the asbestos covered sheet.

After the building-up operation is completed the liners are allowed to remain in the box, with the insulated cover or lid in place, until they are practically cold. Post heating is not required.

Figure 18 shows six built-up liners after removing from the cooling box. Note the carbon plugs in the head stud holes.

Figure 19 shows a liner in the process of having the built-up head contact surface machined to the design No. 3 liner standard dimensions. The round water chanels are drilled and counter-bored after this surface is machined and finished.

After the head contact surfaces are machined and round water channels have been drilled and counter-bored the liners are tested in the test rack assembly shown in figure 12, the procedure of testing being similar to that followed in testing the heads.

Figure 20 shows a group of design No. 1 cylinder liners which have been converted to the design No. 3 type by the procedures previously outlined and ready for final cleaning and application.

In converting the design No. 1 and design No. 2 cylinder liners to the design No. 3 type as outlined it is necessary that the cylinder head studs be removed. If these studs are to be reused it is important that they be removed with a suitable and properly designed stud puller so that the body sections will not be damaged and weakened by nicking, galling, etc.

A Torch Is Mightier Than the Saw

By Otto Gier *

Back in the days of the sledge and bar,
In making repairs to an engine, or car,
We split the nuts we couldn't turn:
With never a thought that iron would burn.
Ignorantly, blissfully, we hammered away,
Never doubting we earned our pay.
Drilling and punching out boiler stays
Who wants to go back to those good old days?
While we sledged and sweated, it came to pass
That iron could be cut with acetylene gas,
A man with a torch does more, by far
Than a dozen men with sledge and bar.
And yet, this ointment contains its fly:
Affecting the boss with a blood shot eye.
'Tis the guy who waits from one 'till three,
For a torch to cut off a cotter key.

* Mr. Gier, supervisor of welding, Great Northern, and chairman of the committee preparing this paper on cylinder head welding, concluded the report with this touch of poetry of his own composition.

The experience gained reclaiming worn parts on the steam locomotives has helped us in fighting wear on diesel parts. The oxy-acetylene, electric arc and heliarc processes are used in reclaiming such parts as cast steel brake heads, cast steel oscillating castings, traction motor gear cases, and traction motor bearings. *Fig. 21* is a view of the many diesel parts reclaimed by welding in one of the shops of a large southern railroad. In this view you can see pistons, in various stages, radiator headers, cylinders heads, radiator spacers and other parts representing a large sum of money. The reclamation cost for these parts was only a fraction of the cost of new parts. The remodeling of diesel locomotive water tanks has been covered in previous meetings of this association, but I would like to mention that such an operation is highly successful. The remodeling consists in cutting out square sections and adding new sections with clean cut openings.

Figure 22 shows an operator repairing a stainless exhaust manifold. This part has been previously welded, but due to defective welding, some of the welds cracked because of vibration and heat. By means of the jig shown and Heliarc welding a great saving in time was accomplished. It would have been impossible to obtain a replacement part in time for the demand.

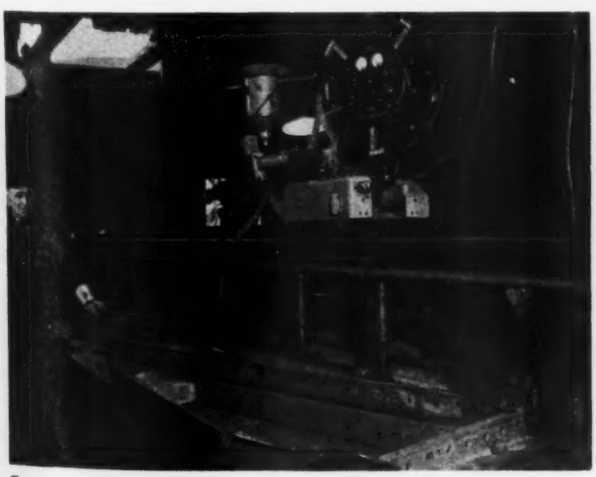
[After the report was read at the Chicago meeting, it was suggested that certain additions be made in the report and so printed in the 1953 proceedings. These additions are included in this abstract.]

Welding Jig for Gondola Side Gussets

The Taylorville, Ill., shops of the Chicago and Illinois Midland have built a 30 ft. long welding jig which holds eight side gussets at a time. The jig is used to weld the seams on the stiffener bulbs, and, after turning the gussets over, to weld the seams for the side stake angles. The gussets are held securely in place for the welding by clamping by banks of three air cylinders 3 in. in inside diameter operated by 90 lb. air pressure. The piston rods of the three cylinders in each bank connect to a ⅛-in. by 1¼-in. angle.

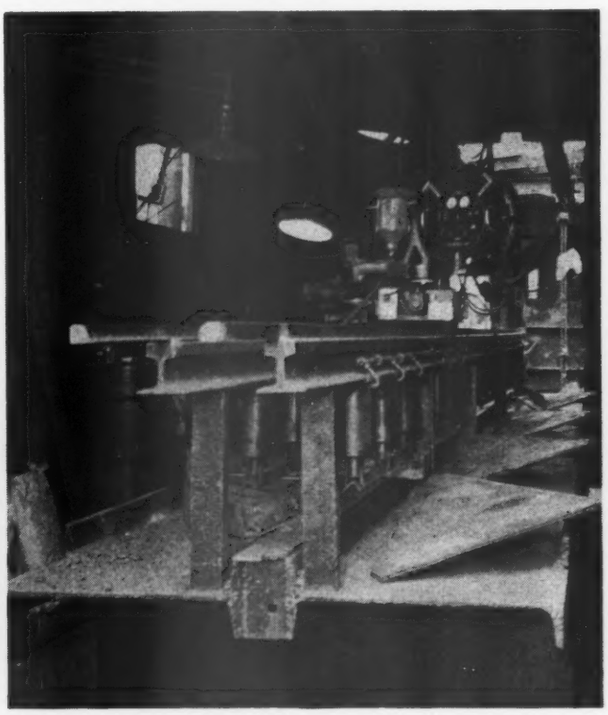
A pair of ⅛-in. by 1¼-in. angles are also used for the track along which the welding head moves. This track in turn is set on top of a pair of scrap rails which are mounted 23¼ in. above the table top. The table top is made from two 24-in. by 7-in. bridge I-beams while the vertical supports are made from 3 in. by 2 in. brake beam channels.

Welding is done by a Unionmelt Model DS welding head on a CM-37 machine carriage with a flexible welding attachment. The only modification was lengthening the bus bar arm eleven inches to reach the side stake seam.

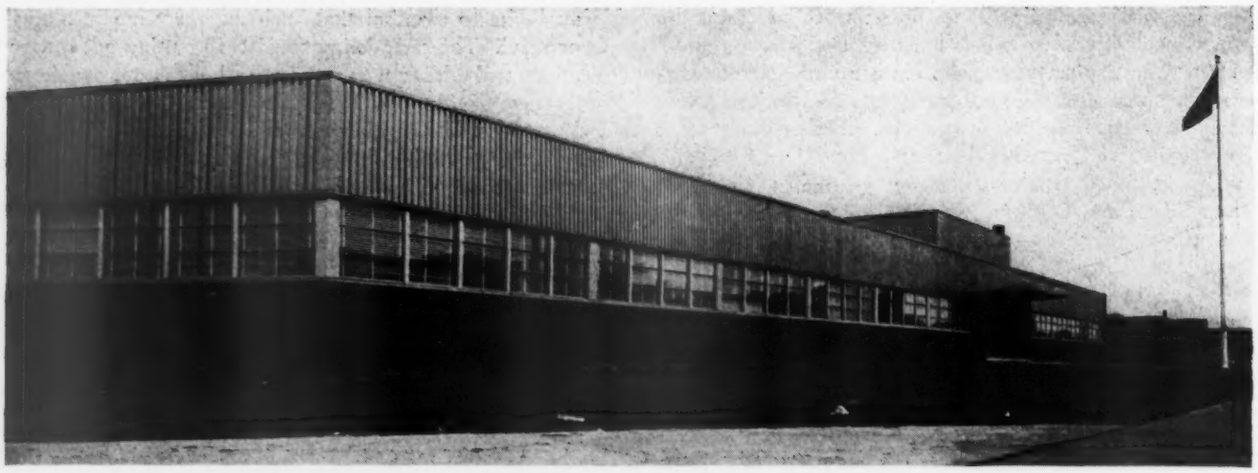


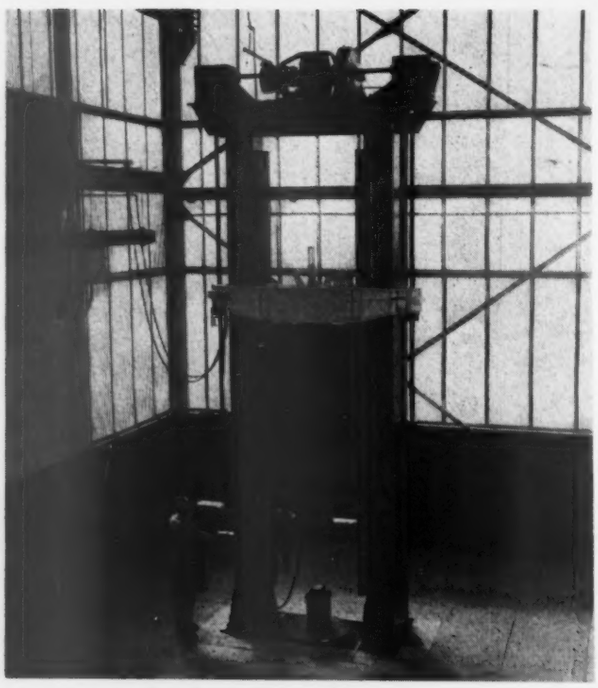
1. The side gussets are placed in the jig eight at a time to weld the stiffener bulb seams . . .

2. After which they are turned over and the seams for the side stake angles are welded . . .



3. Using a Unionmelt Model DS welding head on a CM-37 machine carriage with lengthened bus bar arm for both operations.



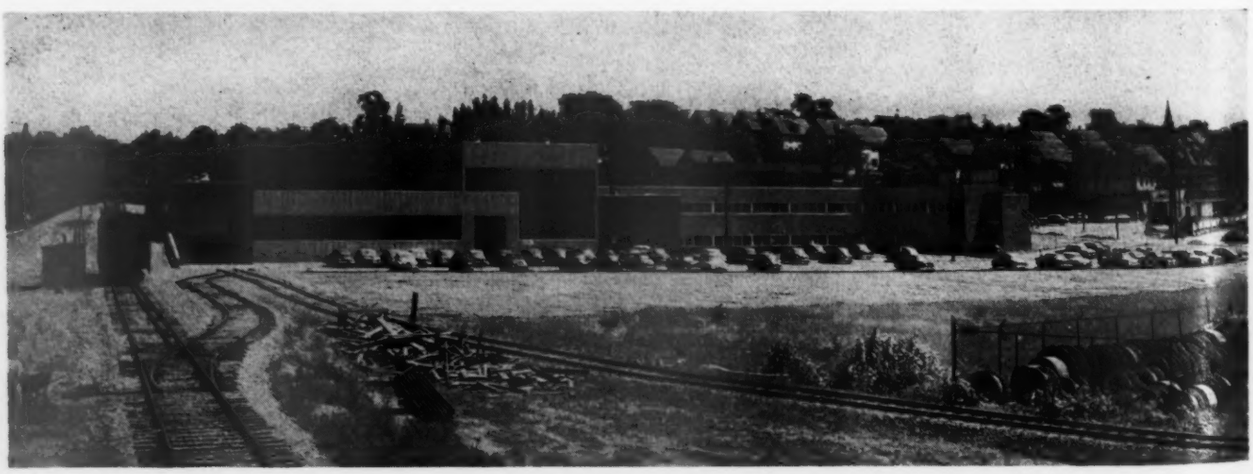


The A.A.R. 27,000-lb. drop-test machine.

National Malleable Technical Center at Cleveland

THE technical center of the National Malleable & Steel Castings Co., which was opened in Cleveland early in October as announced in the November issue, has a total floor space of 36,850 sq. ft. It is composed of four coordinated sections—an extensive physical testing laboratory, an engineering department, a proving ground, and administrative quarters and meeting rooms.

The laboratory is equipped for static, dynamic and fatigue testing. One universal static testing machine, capable of applying loads up to 1,000,000 lb. either in tension or compression, will accommodate specimens up to 10 ft. wide and 16 ft. high. Test loads are measured within an accuracy of $\pm\frac{1}{2}$ per cent. There are four



The rear of the technical center which is adjacent to the National Malleable & Steel Casting Co.'s Cleveland plant. The test track for impact tests on passenger and freight cars is at the left. An inspection pit is inside the adjacent end of the building.

measuring ranges, the lowest of which indicates loads in increments of 10 lb. Reinforced concrete extensions at both ends of the main foundation permit the testing of specimens up to 59½ ft. long. Tension or compression tests on smaller specimens are conducted on a 120,000-lb. universal test machine.

An A.A.R. 27,000-lb. drop test machine is used in the dynamic testing of draft gears. The maximum distance between the hammer nose and the anvil has been increased from 85 in. to 125 in., resulting in an energy increase from 80,000 to 170,000 ft.-lb. The machine is mounted on a 500,000-lb. reinforced concrete inertia block cushioned on 24 groups of nine springs each.

A 1,640-lb. drop-test machine, originally adopted in 1900 by the Master Car Builders' Association, is still used for dynamically testing couplers and coupler parts, also for testing cast-steel wheels and many other items.

Wear tests on full-size railroad wheels and journal bearings are conducted on a wheel and journal-bearing test machine. This machine, in which a complete wheel and axle assembly is mounted, can be driven at speeds up to the equivalent of 100 m.p.h.

The service life of journal-box lids can be determined on a low-capacity, medium-high-frequency fatigue testing machine which can also be used to check the resistance to fatigue of small assemblies and test specimens. One hour of operation is equivalent to one month of service in testing journal-box lids.

Vertical, transverse, or twist loads on railroad truck side frames can be applied in many combinations or of the magnitude desired on a high-capacity, low-frequency dynamic fatigue test machine.

The coupler angling and anti-creep test machine simulates coupling conditions for any type of passenger-, freight-, or mine-car couplers. It is used also to investigate the effectiveness of the various design features in couplers that prevent accidental uncoupling.

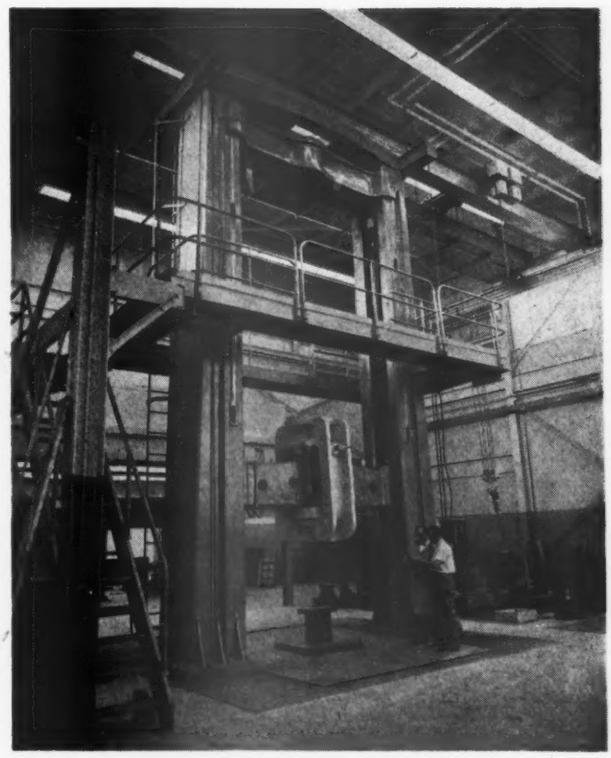
A Toledo press is used for breaking in friction surfaces and can apply compression loads up to 600,000 lb.

A small machine shop is maintained for the production of miscellaneous jigs, fixtures, etc., needed in test work. Auxiliary equipment, such as Magnaflux and hardness testing machines, is also available; several recording oscillographs with calibrating units for multiple pick-up devices, and a Dumont cathode-ray oscilloscope.

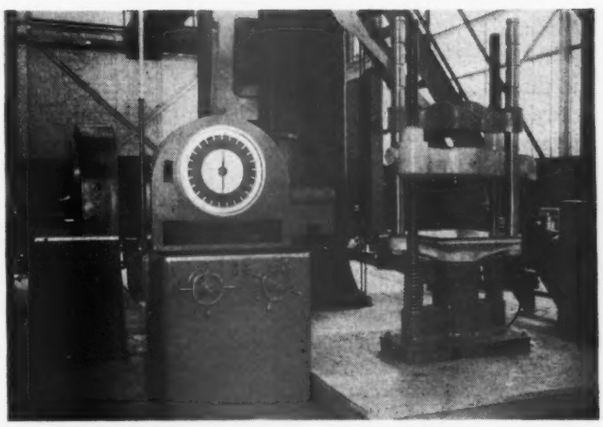
The test track on the proving ground outside the building is 195 ft. long. It has an incline of 12 per cent from a height of 21 ft. Impact tests on standard freight and passenger cars are made at speeds up to 22 m.p.h. The impacting cars are pulled up the incline with a power winch to a height which will produce the desired speed. An automatic device, fastened to the puller car, releases the impacting car, allowing it to roll into the standing car which is equipped with the devices to be tested. After impact, cars are retarded by means of air brakes, rail skids and the safety incline of the test track.

Under-car inspection and application of instrumentation is made from 65-ft. pit located in the building. The pit is accessible from either end. Stresscoat brittle lacquer applied to car structures under study reveal critical stress areas where S-4 strain gages should be applied.

Other equipment at the center includes still and both standard and high-speed movie cameras. There is also a well-equipped dark room.

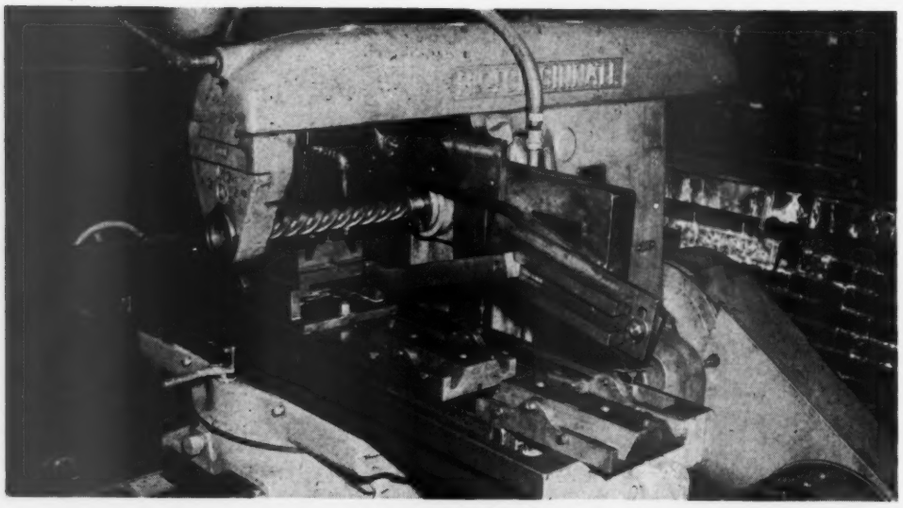


The Tate Emery 1,000,000-lb. universal testing machine.



A 120,000-lb. universal machine for testing small specimens.

Coupling angling and anti-creep machine.



Wedge reclamation radius attachment mounted on milling machine. Extra wedge adapters for 5½-in. by 10-in. and 6-in. by 11-in. wedges rest on machine table.

Reclamation of Journal-Box Wedges

In the reclamation of journal-box wedges, the milling process is used on the Santa Fe to restore the standard back radius of 78 in. The milling machine radius attachment and holding fixture shown was designed and built by Santa Fe shop forces and will accommodate journal bearing wedges of three sizes: 5 in. by 9 in., 5½ in. by 10 in. and 6 in. by 11 in.

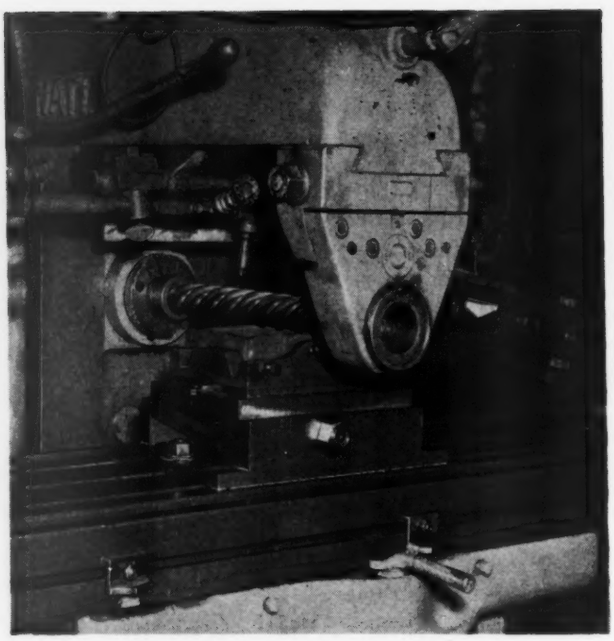
The general arrangement of the milling attachment and three adapters for the various wedge sizes are shown in two views of the device applied to a Cincinnati No. 4 milling machine and using a left-hand cut, right-hand spiral, 1¾-in. diameter, 45-deg. helix milling cutter with pilot. The adapter may be reversed to suit other mills available and cutter conditions by placing the radius attachment and support on opposite side of machine overarm and reversing the radius fixture and connecting arm accordingly. In the particular set-up shown, a left-hand cut, right-hand spiral milling cutter is required.

There is sufficient radius adjustment in the fixture and table mounting to compensate for normal cutter wear. However, it is essential that a cutter not over 1⅞-in. diameter be used to hold the shoulder radius within reasonable limit as indicated in the wedge drawing.

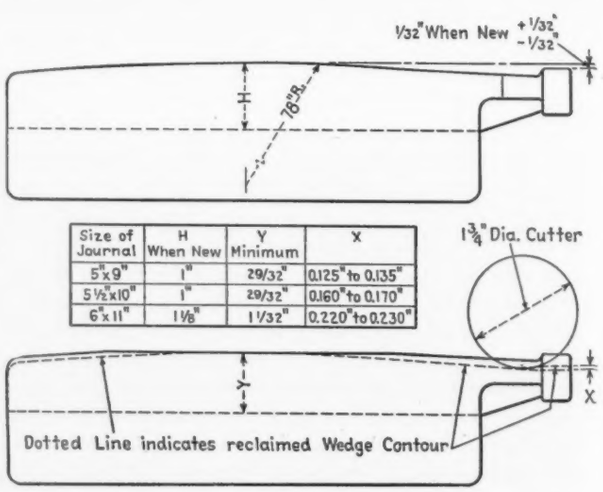
It is important to see that adjustments built into the device are used to produce a crest or thickest point of the reclaimed wedge in its proper longitudinal location which is off center with respect to the overall wedge length. Once properly located, no further adjustments are required.

Recommended milling speeds and feeds, or cutter speeds, are about 100 r.p.m., approximating 50 surface ft. per min. and 3-in. per min. table feed. The production rate is about ten wedges an hour for all sizes. The actual cutting time differential of one wedge size with another is negligible compared to the set up and removal time which remains constant.

Journal bearing wedge condemning thickness gages have been made, predicated on $^{29}/_{32}$-in. minimum wedge thickness for 5-in. by 9-in. and 5½-in. by 10-in. wedges and $1^{1}/_{32}$ in. for 6-in. by 11-in. wedges.



Radius milling attachment midway of cut.



Size of Journal	H When New	Y Minimum	X
5"x9"	1"	29/32"	0.125" to 0.135"
5½"x10"	1"	29/32"	0.160" to 0.170"
6"x11"	1⅛"	1 1/32"	0.220" to 0.230"

Reclamation of journal bearing wedges by milling new standard back radius.

First step in reinsulating a coil consists of filling voids in low spots in the original step insulation with Silastic 122, a tacky paste which provides a smooth taping foundation and cures to a resilient high temperature bond during baking. Pieces of silicone mica cloth are fitted around the lead ends.

Silicone Rubber Insulation For Traction Motor Frame Coils

Santa Fe modernized motors are given high current rating. None has failed due to insulation breakdown. Field coils approaching million-mile mark without signs of depreciation

THE Santa Fe has always been vitally interested in securing a more powerful traction motor. Conventional Class B insulated motors are satisfactory enough for level territory or comparatively light work, but they cannot be used on many mainline operations. According to Santa Fe, they required expensive and time-consuming helper service on long grades, they restrict continuous handling of heavy tonnages, and they deteriorate badly in as little as 100,000 miles or 9 to 10 months of heavy-duty service. Frequent shopping is necessary and the lost availability time of the held-out locomotives runs high.

Inasmuch as extra power from any motor is basically a function of increased heat resistance, the Santa Fe considers silicone (Class H) insulation an excellent means of up-rating power output without changing the physical characteristics of the motor itself. This attitude has been borne out by hundreds of millions of miles of rugged service over the past few years. Santa Fe silicone-insulated units are completely interchangeable in their class, and they compare favorably with the most powerful traction motors on the market today.

The Sant Fe's first silicone insulated motor went into service February 5, 1946. The field, interpole and armature coils were wound with Class H (silicone coated glass-mica cloth) insulation by the National Electric Coil Company. This motor had already been re-insulated with Class B materials twice, at intervals of little more than 100,000 miles. Since being insulated with silicone, its accumulated mileage has shopped it for reconditioning

After a thin coating of 997 silicone varnish has been brushed on the copper to assure a good grip on the surface, a layer of .010-in. fibrous glass tape, pretreated in silicone varnish, is half-lapped around the coil.

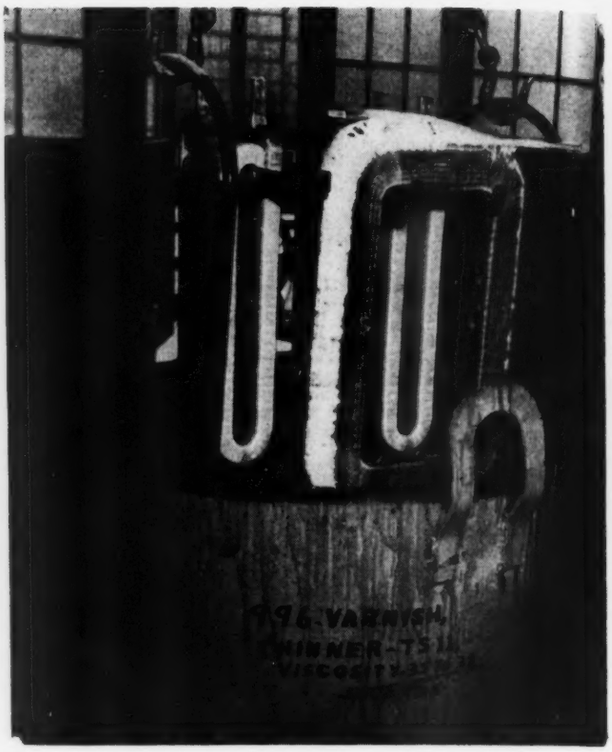
six times;—three times from passenger and three times from freight service. The armature coils failed to pass the electric tests at just under a million miles, and were replaced. But the field and interpole coils are still good, still resilient, still tight on their pole pieces after a total of more than 1,250,000 miles of heavy-duty service.

Silicone insulation was not specified as a standard for all traction motor field coil rewinding, however, until December 1, 1949; or after the introduction of Silastic R tape, a product of the Dow Corning Corporation. Although difficult to apply to armature coils, this new material rapidly proved to be an almost ideal insulator for field and interpole coils. Made up of glass cloth tape, coated with semi-vulcanized silicone rubber, Silastic R tape cures under heat to provide a one-piece jacket with good dielectric properties and the ability to retain a remarkable degree of resilience after long exposure to high temperatures.

Although it is difficult to conceive of a rubbery material which remains rubbery in spite of temperatures in the range of 500 deg. F., this characteristic was demonstrated more than once. One of the first test coils, in fact, was in the oven when a thermostat went out of order. The oven temperature rose to over 500 deg. F. and remained there for several hours. By the time the error was discovered, the solder had melted out of the lugs. But the Silastic insulation was in excellent condition, and as resilient as ever.

This heat stability is also evident, of course, on every Silastic insulated coil that returns to the shop for inspection. The shop has yet to see such a coil loose on its pole pieces. Once one of these coils is tightened on, it stays tight. As a matter of fact, the shop has also yet to see any sign of insulation deterioration in these coils at all, and many of the early ones are now approaching the million-mile mark.

Several of these were subjected to unusually servere service, too. After Santa Fe specified this type of insulation for every wound coil, Silastic-insulated coils occasionally were used as individual replacements in frames which were otherwise Class B insulated. When one such traction motor was damaged by fire, the Class B coils were ruined; but the two Silastic-insulated



To thoroughly bond the first layer of insulation, the coil is dipped in silicone varnish, drained and baked from 6 to 8 hours at 550 deg. F.

coils in the frame were returned to service without any repairs whatever.

Although these Silastic-insulated coils served as replacements for all burned-out coils, their use was concentrated on what was then the most powerful of all traction motors. Rated at a capacity of 700 amp. under continuous load, this motor was used almost exclusively on heavy-duty service. Whenever one came in with a bad frame coil, all eight field and interpole coils were replaced with Silastic-insulated members in an effort to give the motor even greater pulling power.

On October 17, 1950, the Santa Fe embarked on a program of complete modernization for this type of motor. This meant that besides using Silastic insulation on the field and interpole coils, they also included the following:

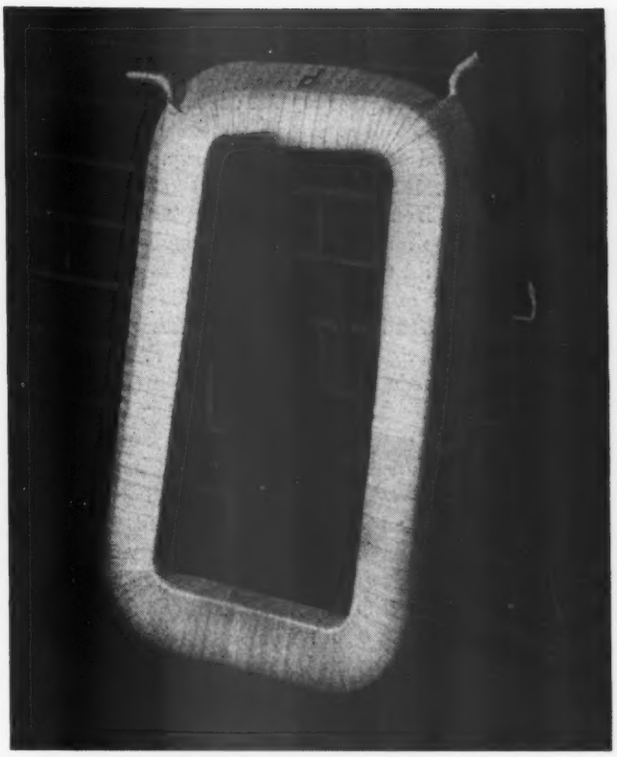
FRAME: Cable leads replaced with straps on main and interpole coils.
Interpole coils hot pressed on pole pieces.
Strap leads from coil to coil.
All connections brazed or pressure-crimped.
Larger external leads, neoprene-covered.
Rubber spacer blocks between frame and interpole connections.

ARMATURE: Class H (silicone-varnished glass cloth) insulation on aramature coils.
Install new commutator with ¾-in. neck width.

Axle caps are also installed on the motors that need them. However, the shop has been replacing the old grease fittings with oil fittings for over four years. For the sake of complete interchangeability, oil fittings are installed even on motors which are still grease-lubricated.

The Santa Fe believes that its modernized motor is

After the first dip and bake, the coil is wrapped with silicone bonded mica glass tape. A half-lapped layer of Silastic R tape (20 mils thick) is then applied. Heart of the entire coil insulation, Silastic tape vulcanizes during baking to form a resilient, one-piece jacket which retains its resistency and its dielectric properties after long exposure to high temperature service.



A layer of half-lapped varnished glass tape is applied over the Silastic tape. Ready for final dipping and baking, the coil is covered with four layers of insulation, each of which is resistant to electrical fatigue at high operating temperatures. The presence of the Silastic tape wrapping, however, gives the coil an added resistance to mechanical fatigue at high temperatures. The initial, shown on the coil, is that of the coil winder responsible for the job.

superior to the strongest, most powerful traction motors on the market. Its rating is better than 825 amp. under continuous load, and it is completely interchangeable in its make of locomotive. Although used almost exclusively on the most rugged heavy-duty service, not one has failed to date. Best of all, it can be produced at a considerable saving under the list prices of any outside concerns.

To do so, the San Bernardino shop is set up for maximum production. It has to be. Not only does it handle the traction motors from all locomotives shopped there, but motors are shipped there in specially fitted cars from all other points along the Santa Fe system.

Freight locomotives, incidently, are shopped at 200,000 miles, regardless of the type of service; passenger locomotives at 300,000 miles, and switchers every six years.

To keep up, Santa Fe engineers have designed a production line that permits a minimum number of men to recodition an average of 165 motors a month, plus about 13, main generators. This output is on the increase. Last year they averaged 155 per month; in 1951, 142; and in 1950, 118.

Traction motor modernizations average about 9 per month, a figure which is decreasing as they gradually catch up. Motors are modernized only when they need some rewinding any way. The shop doesn't have the capacity to modernize all the 700-amp. motors as they come in. So far, they have modernized 400 out of a total of 1,817 such units in service. They expect to have them all done in two or three years.

All motors and generators entering the shop are steam-cleaned, put through a vapor degreaser, and disassembled. In line with the principle of complete interchangeability, the frame and the armature are considered separately and proceed on their own, rather than as a unit.

The frame coils are given a Megger insulation test. If their reading is over 1 megohm, they are given a high potential test, in which they must stand 1,500 volts a.c. for one minute. The frame coils are also inspected closely. Inspection is perhaps even more important than the electrical tests, which are regarded as a means of catching the few bad frame coils which look good on the surface.

If the frame is satisfactory, it is given an armature from stock and sent out. If not, and if it is an ordinary Class B motor or one of the relatively new 825-amp. motors which have been on the market since 1949, the bad coils are replaced from stock and the frame is sent on. If it is one of the old 700-amp. units, however, it is modernized.

The first step in modernization is the replacement of all field and interpole leads with brazed straps. The cost of these straps is practically nil. The copper is simply taken from interpole coils with deteriorated turn-to-turn insulation. The coil is straightened, the bad section cut out, and the strapping is milled off. With the help of a specially designed jig, it is bent to shape in a few seconds.

After the strapping is brazed on, smoothed off, and wrapped, the coil is ready for reinsulating. Voids and low spots in the step insulation are filled with Silastic 122, a tacky paste, to provide a smooth taping surface. A thin coating of silicone 997 varnish is then brushed on the copper to provide a tacky working surface and pieces of silicone mica glass cloth are fitted around the lead ends. A layer of .010-in. fibrous glass tape pretreated in 997 silicone varnish is then half-lapped around the coil. To provide a firm foundation for subsequent taping operation, the coil is then dipped in 997 silicone impregnating

varnish, drained and baked from 6 to 8 hours at 350 deg. F.

The next step is a half-lap wrap of .007-in. x 1-in. wide silicone bonded mica glass tape. A coating of 40C silicone adhesive is brushed on to provide a firm working surface and to give bond to the mica tape wrap. A half-lapped wrap of Silastic R-20 (20 mills thick) tape is then applied. Pads cut from rolls of Silastic R-20 tape are also placed on the top and bottom sides of the coil to provide the necessary build up. The coil is again wrapped with a half-lapped layer of plain glass tape .010-in. thick which has been pre-treated in the 997 silicone varnish. Coils are then baked for 6 to 8 hours at 350 deg. F. to vulcanize and cure the Silastic tape.

At the end of this baking period, the interpole coils are pressed on their pole pieces. Both main and interpole coils are again dipped in the 997 silicone impregnating varnish, drained, and baked for 8 hours at 350 deg. F.

Recently a coat of organic sealing varnish has been applied over this last coat of silicone dipping varnish, and baked at 350 deg. F. for 12 hours. This coating of organic varnish is used to withstand the effects of the vapor degreasing to which these coils will be subjected during future reconditioning and maintenance.

The finished coils are not returned to their original frame, but are placed in stock. The frame, in the meantime, has drawn other coils from stock and gone on. Only two types of field coils are kept in stock;—the standard beveled type and the step type as used on the 825-amp. motor introduced in 1949. Both types are given identical insulation. Although the dimensions of step coils differ slightly from those of the standard coil, the Santa Fe has never changed their standard model to duplicate them. All field coils, regardless of design, are considered more or less interchangeable even within the same frame.

Coils are assembled in the frame with strap, or bus bar, connectors; The source and cost of which, incidentally, is the same as that for the coil lead straps. Joints are brazed or pressure-crimped.

The strap connectors are insulated separately and kept in stock. Insulation consists of a brush-on coat of silicone 997 varnish, a half-lap wrapping of Silastic R Tape and a half-lap layer of silicone-varnish-treated glass tape. After assembly, the wrapping is continued out on over the joints.

Baffle blocks are not installed unless step coils are used. Rubber spacer blocks, however, are inserted between frame and interpole connection straps to eliminate fatigue due to vibration of the interpole lead. Standard 775-24 exterior leads are replaced with new 1000/24 neoprene-covered cables.

The cost for total modernization in the shop compares directly with an ordinary Class H rewinding job. The extra work, in other words, costs practically nothing. Flexible coils, for instance, must generally be replaced anyway. Straps can be fastened on as fast or faster and they cost less. The bus bar, too, can be connected up as fast or faster than bolted cable connections.

To complete the modernization, armature Class B coils are replaced with Class H coils insulated with silicone coated mica-glass cloth—not Silastic tape. The pinion air baffle is removed, and the commutator is replaced with a new one having a ¾-in. neck width.

After such lubrication fitting work as may be required, the reassembled frame is given a spray coat of red asbestos insulating paint, Class H armature is added, and the completed motor is returned to its point of origin. It is then considered by the operating department to be capable of operation in all classes, regardless of mix, position, or type of service.

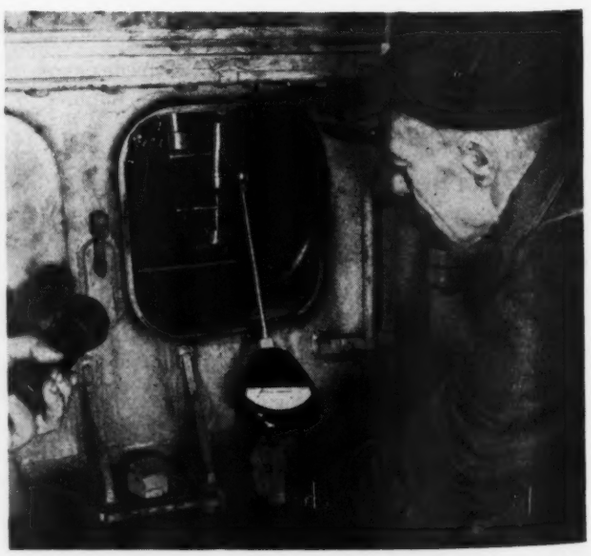
Specification of Silastic insulation has resulted in better motors, and has also provided faster movement through the shop. Every coil is wound the same way with the same materials, including those for main generators and even for car lighting generators. Having one insulation every coil reduces the opportunity for human error and cuts required stock space and inventory costs substantially.

Class H materials also keep well in stock. Class B kits for smaller motors have reached the point where they must be dated to assure using the oldest ones first. Suppliers agree, rating the storage life of Class H kits at twice that of Class B kits. Rolls of Silastic tape, of course, remain effective indefinitely, even when stored in a somewhat overheated warehouse. In the field, Silastic insulation gives longer service under greater loads. Early Silastic-insulated coils are approaching the million-mile mark without showing a sign of deterioration. They are expected to exceed the two million mark easily.

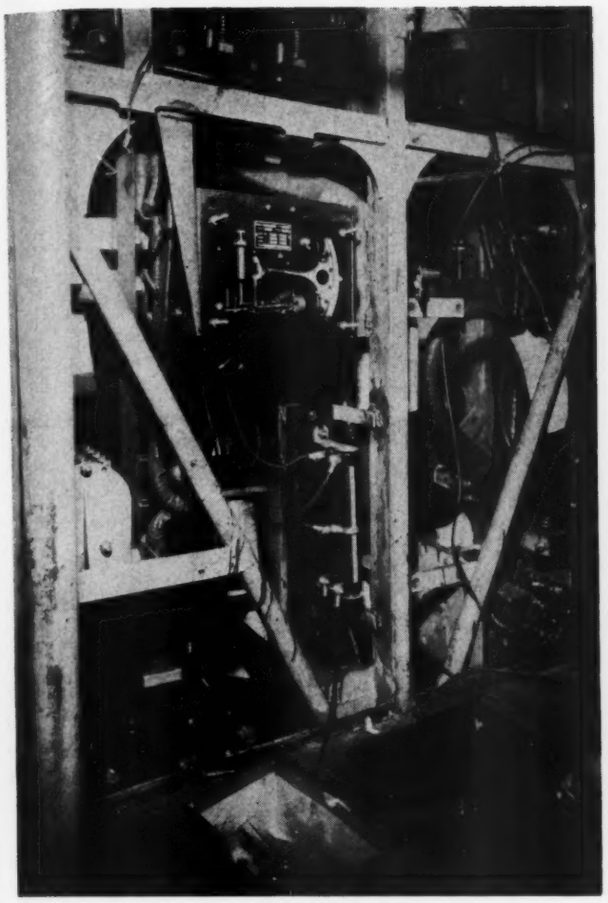
The interchangeability of the modernized motors cuts inventory costs and keeps locomotive availability high. Santa Fe has never yet had a modernized motor fail due to insulation breakdown. Many of them have stood up well under exceptional hardship.

Recently, for instance, several of them were entirely submerged in a flood. Class B motors, similarly flooded, required a complete new rewinding. The Class H motors, were simply flushed out with a steam jet, baked dry, and returned to service.

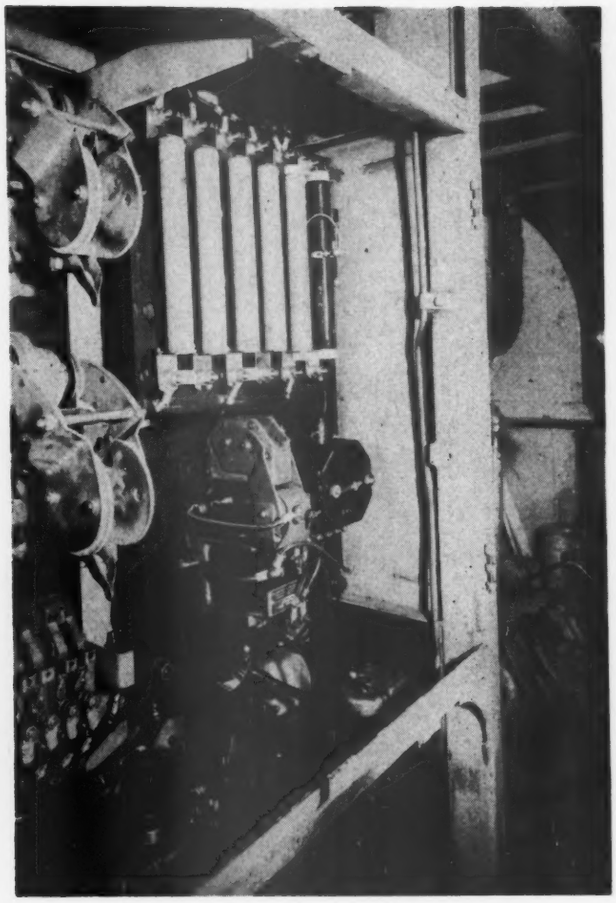
Since insulation heat stability is the greatest factor in determining the capacity of a traction motor, it is evident that the use of Silastic insulation means greater availability, economy and safety.



Hand pyrometers are now being used by the Delaware and Hudson to measure diesel locomotive engine bearing temperatures. The pyrometers used are General Electric Type FH-1 instruments which are oil-resistant and not effected by the oil bath in which the bearings operate.



The braking current limiting regulator.



The brake warning relay is on the lower right section of the panel. The two forward transition relays which have a similar outward appearance are in the section of the cabinet above the one shown.

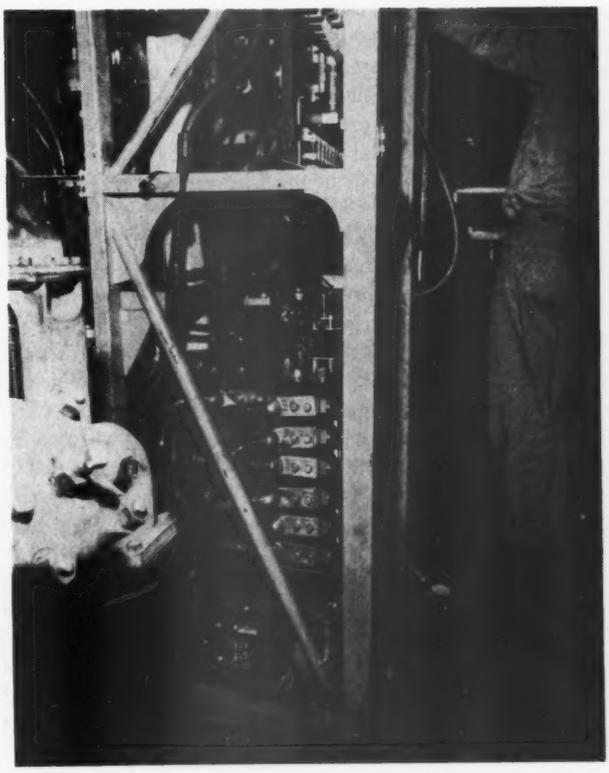
Adding Dynamic Braking

To realize the advantages of the newest type dynamic brake, the Southern is applying it to 68 locomotive units not so equipped when purchased

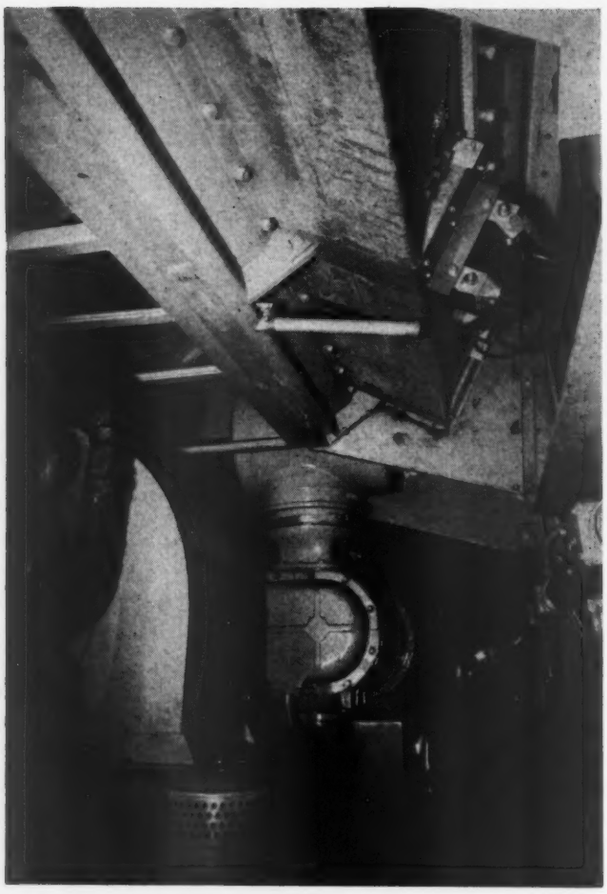
THE Southern is equipping 68 relatively new Type F7 Electro-Motive diesel-electric locomotive units with 700-amp. dynamic braking. This requires a roof-mounted grid hatch with a d.c. blower motor. The resistance grid is divided into four sections, one for each traction motor, and the blower motor for cooling the grids is connected across the No. 4 motor section of the grid. Its speed varies with the braking current.

A six-pole cam switch is installed which connects the traction motor armatures and fields in series for running and which connects the traction motor fields in series with the main generator armature and each motor armature across a section of the braking grid for dynamic braking.

A current limiting regulator is installed which limits



The six-pole cam switch which arranges the motor connections for motoring or braking. The backward transition relay is shown below.



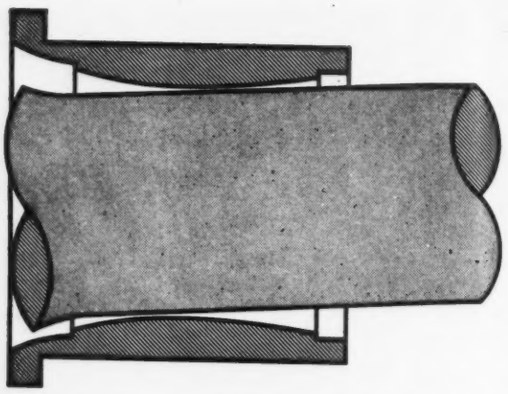
One of the grid hatches at one side of the roof of a locomotive unit.

braking current to 700 amp. When the manually-controlled braking current reaches 700 amp., the voltage across one of the braking grids becomes sufficient to operate the brake limiting regulator. The regulator torque motor then moves to apply a small voltage across the main generator shunt field. This opposes the battery field excitation and reduces the braking current. A brake relay is also included which advises the engineman if his braking current should exceed 700 amp.

At the same time that dynamic braking is being added, the traction motors are being regrouped with motors 1 and 3, and 2 and 4 connected in series at low speeds. This is done to minimize wheel slip due to weight transfer —the reduction of weight on the leading axle of each truck which is caused by motor torque. Included also in the improvement program is through-cable type wheel slip protection. The improved slip control is effected by dropping only the battery field and leaving a reduced shunt field in the circuit when slip occurs.

Included also in the modernization program is three-relay automatic transition to replace the older five-relay transition. The three relays are respectively FTM (forward transition motor shunt), FTP (forward transition parallel) and BTP (backward transition parallel).

A 1,500-amp. indicating ammeter is mounted on the engineman's control panel in place of the color-coded instrument used previously. The necessary wiring is accomplished by replacing the original low-voltage cable form or harness with another for the added relays and connections.



Sketch showing how "hourglass" bearing eliminates edge loading. Bearing contours and axle tilt are greatly exaggerated.

Hourglass Axle Bearings

By W. P. Welch

THE axle-bearing bores on Westinghouse diesel traction motors are machined to an "hourglass" shape, with the center of the bore having a diameter of 0.010-in. less than the diameter at each end of the bore. This is done to make allowance for the bending curvature of the axle caused by the locomotive's weight, and contributes greatly to the improved life of the traction-motor bearings.

Calculations made on a typical road-locomotive axle loaded with a 62,500-lb. axle load, revealed that the slope of the axle centerline was 0.07 of a degree at the motor axle-bearing location. Since the bearing is 7¾ in. long. and the motor-frame bores for the axle bearings are machined co-linear, this bending of the axle caused a mis-alignment of 0.0095 in. across the length of the bearing. Providing a bearing with an "hourglass" shape, widened 0.005-in. on the radius at each end, permits this mis-alignment to be accommodated without edge loading and resultant high bearing pressures. The illustration shows how this "hourglass" bearing eliminates edge loading. In the figure, the bearing contour and the axle tilt are, of course, greatly exaggerated.

The bore shape actually used is that of a circular arc, the initial bearing clearances being 0.012 in. at the center and 0.022 in. at each end. This improvement, coupled with the use of spring-loaded felt-wick lubricators, has brought about vastly improved axle-bearing life and has practically eliminated the old requirement of having to remove axle-bearing-cap shims, to compensate for wear. Previously, this was normal practice at 50,000 miles service, followed in many cases by bearing shell replacement at each wheel turning. Today, little wear is evident at wheel turnings, and, if lubricators are properly maintained, the bearings easily have a life equivalent to the motor overhaul period of 3 years, or 300,000 miles.

"Hourglass" axle bearings are a natural outgrowth of a prior Westinghouse development in armature bearings of the sleeve type. In 1925, "hyperbolic" bore armature bearings were introduced on Westinghouse traction motors to correct for the armature shaft mis-alignment caused by heavy pinion-tooth loads.

Mr. Welch is Manager, Mechanical Section, Transportation Engineering, Westinghouse Electric Corporation.

DIESEL-ELECTRICS—How to Keep 'Em Rolling

22 Transition

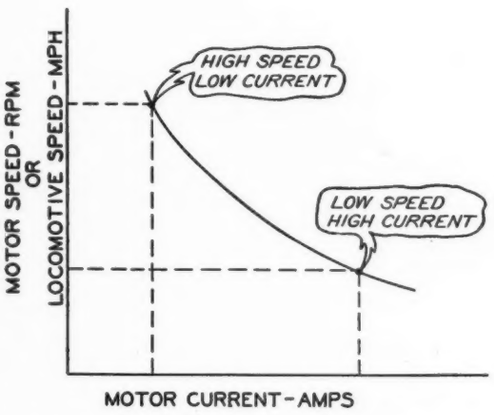


Fig. 1—Speed-current characteristics of a traction motor

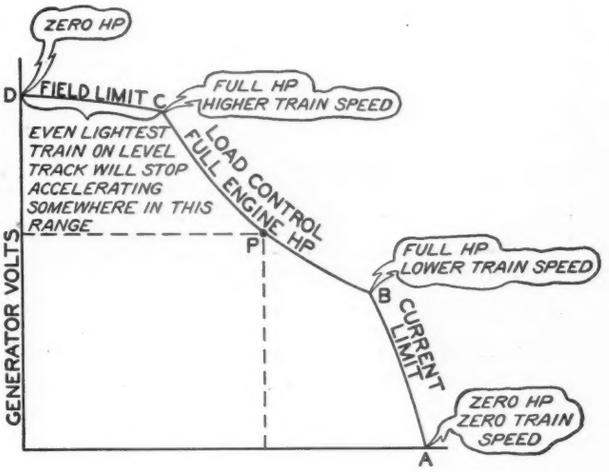


Fig. 2—Volt-ampere characteristics of a traction generator

Electric drive on a locomotive takes the place of gear shifts on an automobile, and makes a better job of it

REMEMBER your bike riding days? There were some stretches of road where you had to keep pumping to keep moving. Other spots were so steep that you had to get off and push. Then there were down grades where you coasted along without much effort. The reason for this was that you had direct drive on your bike and could not adjust your efforts to the grades.

Early automobile builders had to solve this problem. People who bought automobiles were interested in speed, but they didn't want to get out and push on the hills. A set of gears and a gear shift took care of the problem. This gave them power at low speed for the hard pulls and high speed on the open road.

From the start locomotive builders had the same problem. For them it was worse because train weights varied widely and yet schedules had to be kept. A transmission and gear shift couldn't be used because the parts would be too large. So, for a hundred years steam locomotives were built with direct drive like your bike. This meant different designs for different jobs. The freights and switchers had small wheels. This gave them high tractive force but not much speed. The passenger locomotives had large wheels. This gave them speed, but they were slow in getting away from the station.

When the diesel-electric came along it changed the picture. Here was a locomotive that could be built to cover a wide range of speed with full horsepower throughout. This was possible because of the electric transmission. It allowed the diesel engine to run at top speed regardless of locomotive speed. This meant that the locomotive could deliver full horsepower at almost any speed.

Electric Transmission

Let's see how the electric transmission makes this possible. First we will look at the parts it uses.

TRACTION MOTOR. As has already been mentioned the series type d-c motor is used. This type of motor draws a high current at low speed and a low current at high speed. If its load is heavy, it runs at low speed; if light it runs at high speed. The way such a motor acts is shown by Fig. 1. If you have ridden a locomotive and watched the loadmeter you may have noticed this.

TRACTION GENERATOR. The traction generator is a d-c generator. It takes mechanical power from the diesel engine and converts it to electrical power for the traction motors. We have seen in previous articles how the generator is controlled so that it delivers power as shown in Fig. 2. When the load resistance is low the amperes are high. When the load resistance is high the amperes

This is the twenty-second of a series of articles on the maintenance of diesel-electric equipment. This article is written by B. L. Judy and A. V. Johansson, both of Locomotive and Car Equipment Department, General Electric Company, Erie, Pa.

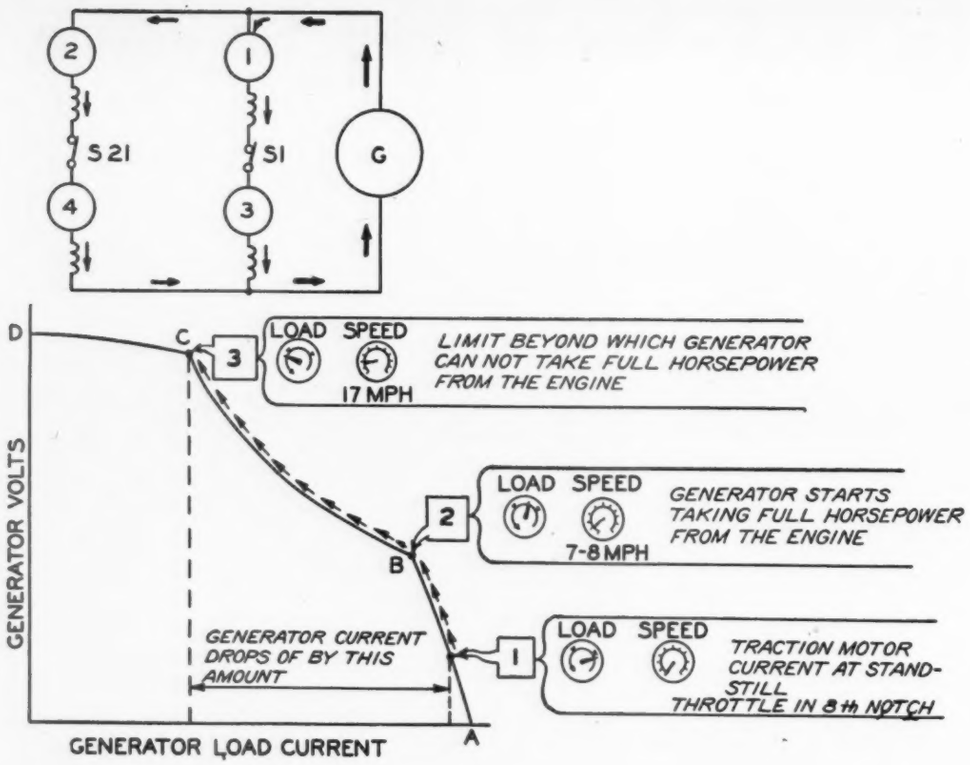


Fig. 3—In getting the train started, we use series-parallel traction motor connection with full field

are low. If you run a load test on a locomotive and draw a curve of the results, you will get a generator characteristic like this.

DIESEL ENGINE. The engine converts the energy of burning fuel into mechanical power. With the throttle at 8th notch and full fuel the engine will run at its rated speed and produce its rated horsepower. If you try to get more power it will stall. If you try to get less power, the racks will "back off" (the engine will take less fuel). So to get the most out of the engine you must stay on the full horsepower part of the generator curve, Fig. 2. When load testing an engine you must use a load resistance value that will work the engine on the full horsepower curve. For instance, you might use a resistance value that would give you the generator current and voltage shown at point P in Fig. 2. If you use a value that doesn't fall on this curve, you will get a low horse power reading.

Forward Transition

We want to keep the engine working on the full horsepower part of the generator curve as much of the time as possible. To do this we use what is called transition. That is, as the locomotive speed changes, we change the trac-

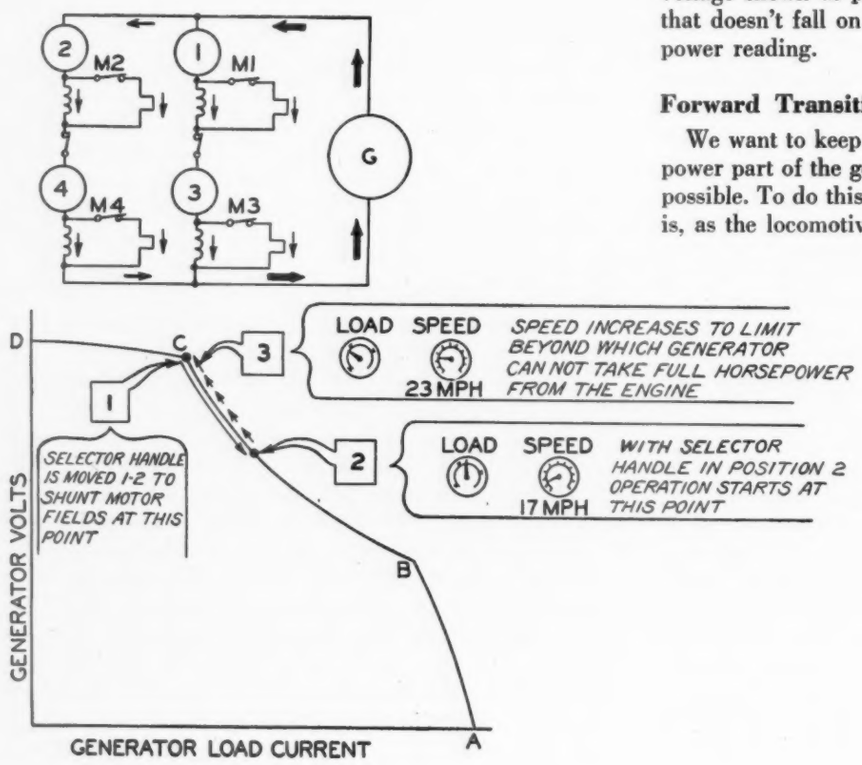


Fig. 4—Moving selector handle to position 2 shunts motor fields and acceleration continues

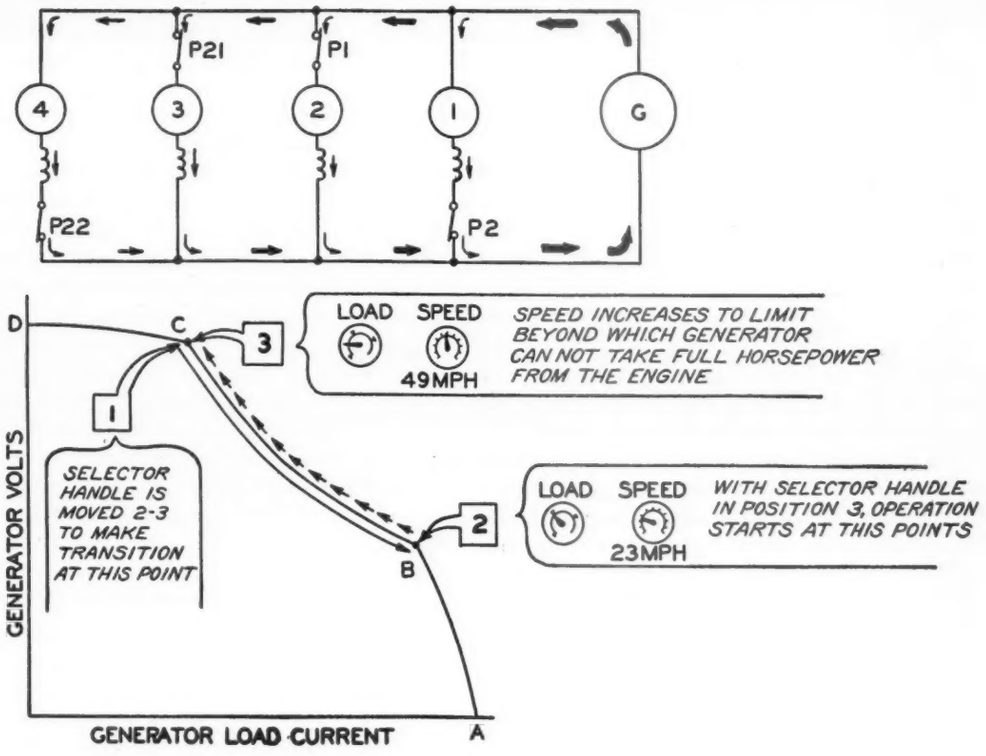


Fig. 5—Moving selector handle to position 3 changes motors to parallel connection with full fields, and acceleration continues

tion motor circuits so that they will draw a value of current that falls on the horsepower curve. Let's see how transition is used to accelerate a train.

At the start the traction motors are connected to the generator as shown in Fig. 3. This means that the generator supplies current through two paths to run four motors. So it has to supply only twice single motor current in starting. Even though the current drawn by each motor is very high, by using such a circuit the generator is kept to a reasonable size.

If you look at Fig. 3, you can see how the current drops off as the train moves out. This is shown by the arrows on the horsepower curve. At about eight miles an hour you get on the full horsepower portion of the curve, point *B*. From here on it is necessary to stay on this part of the curve to get full power from the engine.

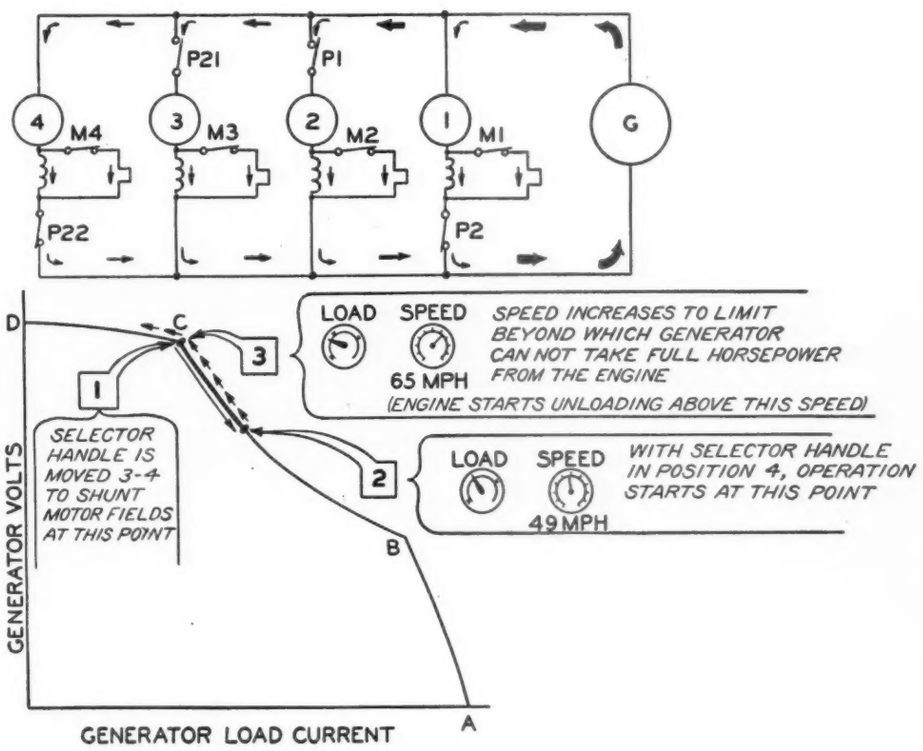


Fig. 6—Moving selector handle to position 4 shunts motor fields in parallel connection, and acceleration continues to maximum speed

Suppose we have a locomotive with 65 m.p.h. gearing and 40-in. wheels. When we read about 17 m.p.h., point *C* in Fig. 3, the motor current will have dropped so much that continued acceleration would be at reduced horsepower along the field limit line.

The selector handle is moved from *1* to *2* to prevent this. Doing this shunts the motor fields as shown in Fig. 4. Part of the motor current will then flow around the fields through the shunting contactors (*M1, M2,* etc.) and the shunting resistors. This causes the motors to draw more current from the generator. The operating point moves back down toward the bottom of the horsepower curve as shown in Fig. 4. On some locomotives field shunting is done in two or more steps. This is done to keep the motor current to a safe value.

As the train continues to accelerate, generator current will again decrease as shown by the arrows in Fig. 4. At 23 m.p.h., it will be back at the top of the horsepower curve again. To prevent unloading, the motor current must be again increased by transition *2-3*. This time we do it differently though. We change the motor connections from series-parallel to parallel as shown in Fig. 5. Instead of two paths for the generator current there are now four. This causes generator current to increase. The operating point is now back at the bottom of the horsepower curve again as shown in Fig. 5.

In making transition 2-3 the *M* contactors (Fig. 4) are first opened. This unshunts the motor fields. Then the series contactors *S1* and *S21* (Fig. 4) are opened. Finally the parallel contactors *P1, P21, P2* and *P22* (Fig. 5) are picked up. This may happen in different sequence on various locomotives, but the end result is the same. Since the generator is at high voltage when this sequence begins, its voltage must be reduced before the switching of the motors can be safely accomplished. This is done by opening the generator field contactor *GF*.

This transition should take place at the right time. If it occurs too late, or at too high a speed, the locomotive will lose power before transition. If it occurs too soon, there will be a loss of power after transition. In either case the operating point will not fall on the full horsepower curve.

As the train continues to seep up, generator current again drops off. By the time the speed reaches 49 m.p.h., the generator will again be operating at the top of the horsepower curve, point *C* in Fig. 5. We are now ready for parallel field shunting, shown in Fig. 6. This is accomplished by moving the selector handle from position 3 to 4. As in series field shunting, part of the motor current bypasses the motor fields through the shunting resistor. The increased generator current moves the operating point down the horsepower curve as shown in Fig. 6, permitting further acceleration at full horsepower.

All these steps are summarized in Fig. 7. Here you can see what happens in starting a train and bringing it up to full speed.

Backward Transition

If the train hits a sufficiently steep grade, it will begin to slow down. As the speed drops, the motor current increases as shown in Fig. 8.

Suppose the train is traveling at 45 m.p.h. when it hits the grade. This point *P* is shown near the top of the curve. As the train slows down, generator current increases. At a speed of around 21 m.p.h., the locomotive will be operating at the bottom of the full horsepower curve, point *B*. Something must be done or the operating point will go below *B*. On locomotives without current limit this could mean overheating the generator. With current limit the locomotive would operate at reduced horsepower and the train would soon stall. The current that the generator must supply can be reduced by making a backward transition. This will transfer the operating point back to the top of the horsepower curve

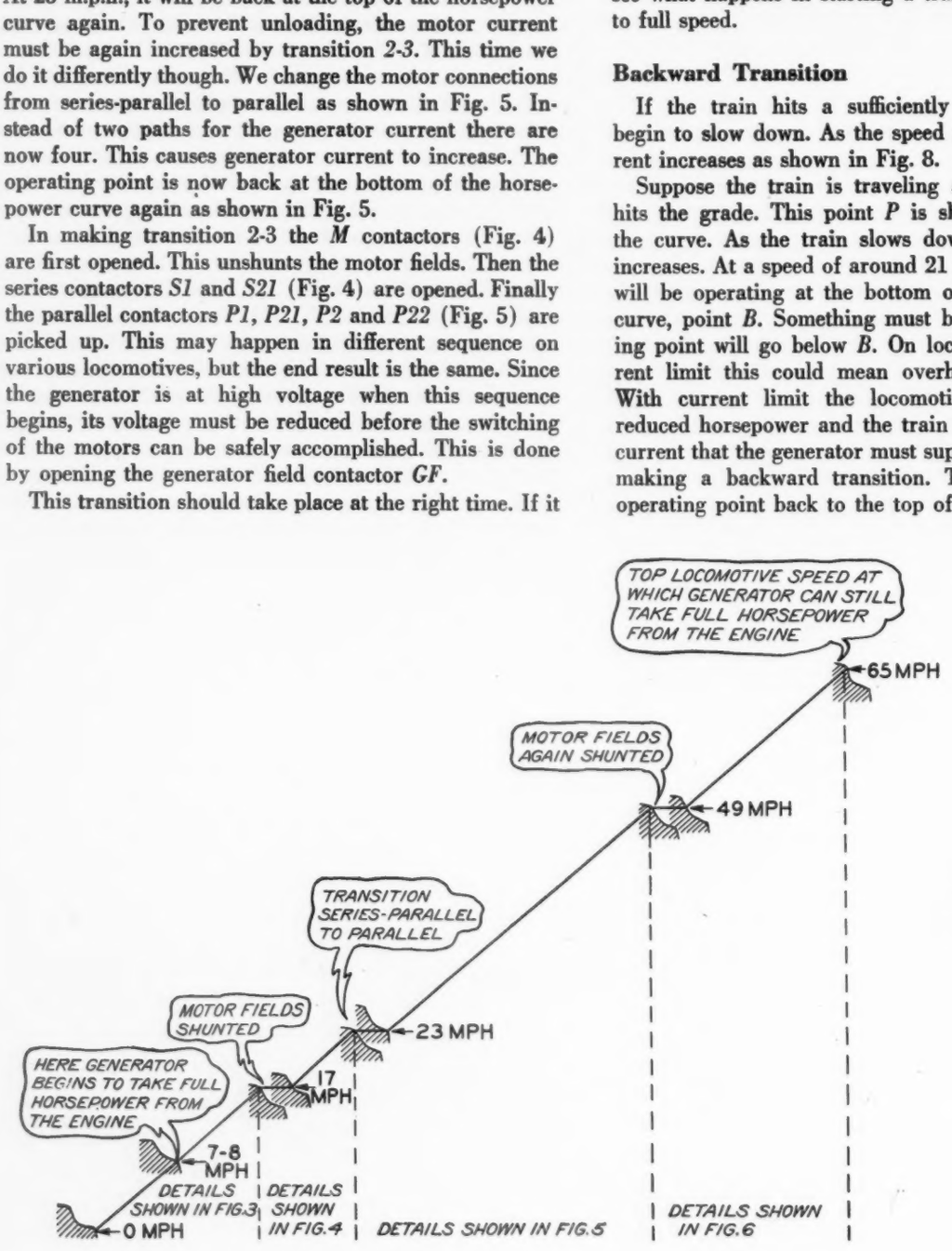

TOP LOCOMOTIVE SPEED AT WHICH GENERATOR CAN STILL TAKE FULL HORSEPOWER FROM THE ENGINE
65 MPH
MOTOR FIELDS AGAIN SHUNTED
49 MPH
TRANSITION SERIES-PARALLEL TO PARALLEL
MOTOR FIELDS SHUNTED
23 MPH
HERE GENERATOR BEGINS TO TAKE FULL HORSEPOWER FROM THE ENGINE
17 MPH
7-8 MPH
DETAILS SHOWN IN FIG.3
0 MPH
DETAILS SHOWN IN FIG.4
DETAILS SHOWN IN FIG.5
DETAILS SHOWN IN FIG.6

Fig. 7 — How transition keeps the locomotive delivering full horsepower when accelerating a train

as shown. If the speed continues to drop, we may unshunt by moving the selector handle from 2-1 in exactly the same way.

There is one little difference in backward transition 3-2 from forward transition 2-3 that is sometimes confusing. The generator field is left on in backward transition, but not in forward transition. There's a reason for this. If you look at the horsepower curve, Fig. 8, you will see that backward transition takes place at point *B* where the generator current is high and the voltage is low. At this low voltage there is little chance of the generator flashing over when the switching is done. Also, with the field on, the generator voltage does not drop during switching. This provides for the quickest rise to full voltage after the switching is completed. So you are still operating at full horsepower, but now at the top of the horsepower curve.

From what we've said, you see that transition takes place back and forth as train speed and load change. Its purpose is to hold the operating point on the generator horsepower curve. This keeps the engine delivering full horsepower at all times.

Now let's see how transition is made. There are two methods in general use on diesel-electric locomotives today.

Manual Transition

This is pretty much like the old familiar standard gear shift on automobiles. The engineman uses a selector handle on the control stand to make the transitions. It's better than the auto, however, because the locomotive speedometer is arranged to tell the engineman when to move the selector handle. On most locomotive speedometers of this type there are sections marked for each of the four selector handle positions. This requires the engineman to watch the speedometer so he will know when to move the selector handle. Otherwise, he will not utilize the full power of the locomotive.

In the shop, it is very easy to check transition sequence on locomotives equipped with manual transition. You just set up as though to run the locomotive, but have the engine shut down. Then move the selector handle from position to position and observe that the proper contactors close for each position.

Since the speedometer signals the engineman when to make transition, it must give a pretty close reading of speed. If you have locomotives with different traction motor gear ratios, it is important that the right speedometer be on each locomotive. Take care that they do not get mexied up. The reason for this is that the speed for transition is fixed by motor speed. Therefore, transition on different locomotives will occur at different train speeds, depending on the gearing. Use your instruction book to tell if you have the right speedometer. The transition marks on the scale should agree with the transition speeds given in the book for that particular locomotive gearing.

Automatic Transition

This compares to an automatic gear shift on an automobile. Automatic transition is pretty generally used on locomotives being built today. There are several reasons for this. It relieves the engineman of having to watch the speedometer so closely, assures the best locomotive performance, and it gives smoother train handling.

As we have already seen, transition is made at a definite train speed and also at definite points on the generator horsepower curve. This makes possible two methods of bringing about transition automatically. Let's take a look at them.

(a) The first is based on train speed. It uses an axle generator and speed relay panels. A small a. c. generator, mounted on one of the journal boxes, is driven directly by the axle. This means that it turns at the same speed as the wheels. Hence the a. c. frequency that it puts out will vary with locomotive speed. The faster the locomotive is going, the higher the frequency will be. This axle generator is simply a permanent magnet armature that rotates in a stationary field winding. It has no brushes, commutator or armature windings to get out of order, so there is practically no maintenance.

The output from this generator is fed to the speed relay panels. There is a panel for each step of field shunting in each motor connection, and also one for

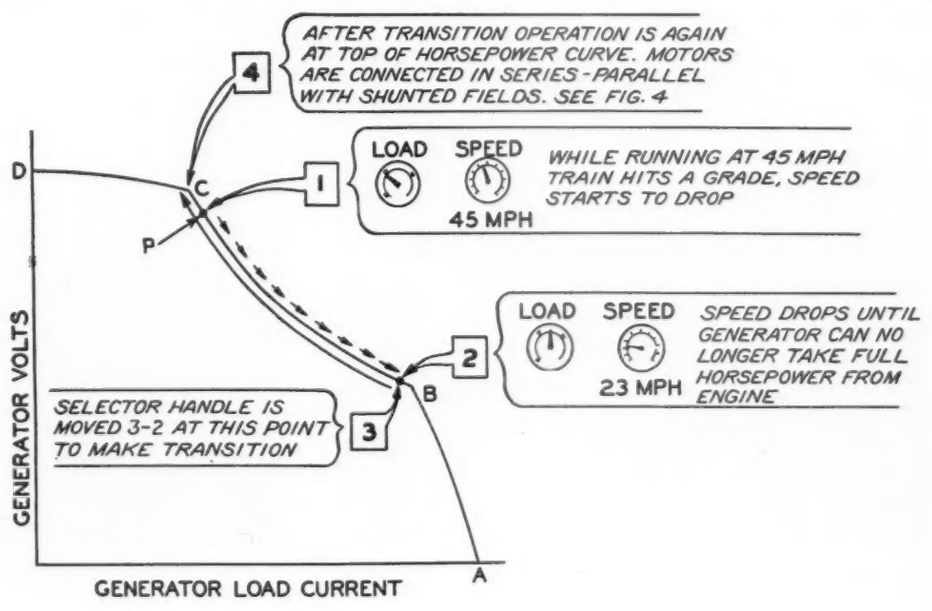


Fig. 8—If train slows down on grade, selector handle must be moved back at proper speeds to keep locomotive operating at full horsepower

transition. Each panel is sensitive to only one a. c. frequency. When the locomotive speed gets up to a point where the axle generator frequency matches the frequency setting of a speed panel, the speed relay on that panel will pick up. This will cause transition or field shunting, as required at that train speed. As long as the frequency remains above the panel setting, the relay will stay up. When the frequency drops a little below the pick-up setting, the relay will drop out.

Each panel is designed to be adjusted within the frequency range marked on it. This adjustment is easily made in the shop. Simply drive the axle generator with a variable-speed motor to slowly pass through the required frequency. Note the value at which the relay picks up. If this is not correct adjust the panel so that the relay just picks up at the proper value. The magnetic structure of the adjustable reactor should be tapped lightly after each adjustment to be sure that the metal laminations are seated before the setting is checked. The frequency setting is dependent upon the traction motor gearing, but not upon wheel diameter. When setting these panels be sure that you use the right frequency setting for the gearing on that particular locomotive. This is given in your instruction book. You can partly check automatic transition sequence on a locomotive by manually closing the transition relays on the panels. A complete check requires that the axle generator be driven with a motor to pick up the speed relays. If a unit is reported "unloading at some speeds" on the road, one of the possibilities is that these speed settings are off. Once set, they change very little from year to year.

(b) The second method of controlling automatic transition is based on generator volts and amperes. Relays that pick up on generator voltage at the top of the generator horsepower curve, point *C* in Fig. 2, bring about forward transition. Usually one relay is used for field shunting in series-parallel and parallel. Another relay is used for series-parallel to parallel transition. One or more additional relays that operate on generator current at the bottom of the horsepower curve, point *B* in Fig. 2, are also required for backward transition. For satisfactory operation, these relays should be accurately calibrated on the bench. On the locomotive, transition sequence can be checked by operating these relays by hand. If they are out of adjustment, the locomotive will not develop full power at some speeds. In extreme cases the generator might be badly damaged.

If you've ever driven a car with a faulty gear shift you know some of the troubles you can get into. A locomotive with defective transition is about like that. It can get into plenty of trouble on the road, and may even damage itself. Here's another place where an ounce of preventive maintenance may save many pounds of corrective labor.

Telephones Keep Blueprints Out of Locomotives

A fast and effective method of checking circuits in a re-wired locomotive, or for trouble shooting, is in use in the Jacksonville, Fla., shops of the Seaboard Air Line. The checking is accomplished by means of four voice-powered telephones, three of which are in the locomotive and one in the shop foreman's office. All of the telephones are connected together and anyone speaking in to any one phone can be heard in the other three.

The only wiring diagram used is laid out on the foreman's desk under good light, away from shop noise. The man or men working in the locomotive where the lighting is usually not good, where spaces are small, and where other men are also working, only need to have a test lamp or instrument and need not bother with bulky prints or with circuit sketches.

The procedure, which is systematic consists of the man in the foreman's office telling the electrical worker on the locomotive what instrument to connect to what terminals and to report the result.

Control circuits are checked on 64 volts with a test lamp or voltmeter for continuity of circuits and operation of relays. High-voltage grounds are tested for with a high-voltage Megger tester and low-voltage grounds are tested for with a voltmeter. This method is also used for checking rewired cabinets before they are placed on the locomotive.

With the wiring diagram spread out in the foreman's office under good light, each circuit can be checked systematically.

The man in the locomotive with his phone hooked over his cap, has both hands free and no wiring diagram to bother with.

THE ENGINEER'S REPORT

DATA

LUBRICANT RPM Delo Oil R.R.

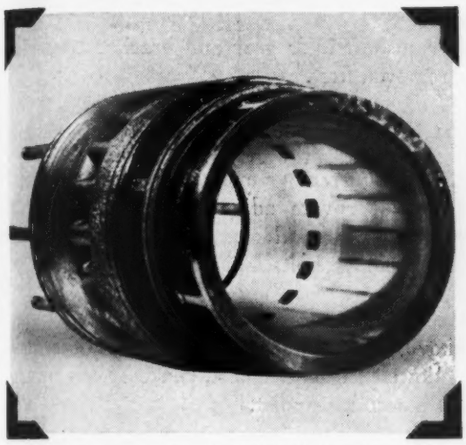
UNIT Diesel locomotive

SERVICE Mountain freight haul

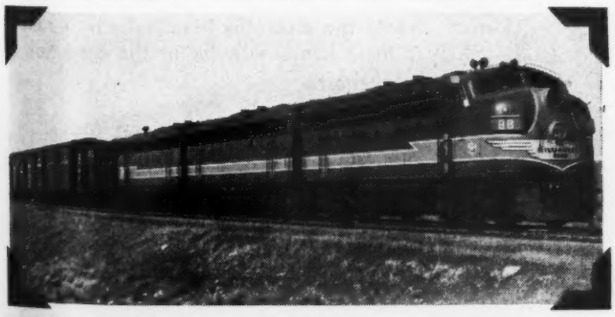
CONDITIONS Long, continuous grades to 1.6%

FIRM The Milwaukee Road

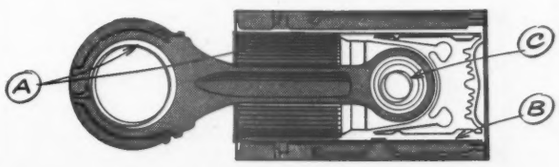
333,590 freight miles—only 0.0035 inch liner wear!



LUBRICATED WITH RPM DELO OIL R.R., this representative cylinder assembly was in good condition when pulled for regular inspection after 333,590 actual freight miles. Operation was on The Milwaukee Road's tough run between Othello, Washington, and Avery, Idaho. This liner, shown as it came from the engine, miked only 0.0035 inch wear, 0.001 inch taper, despite hard operating conditions—heavy loads, wide temperature variations, heavy grades, including one stretch of 20 miles of continuous 1.6 percent. Neither wristpin or bushing showed measurable wear.



How RPM DELO Oil R.R. prevents wear, corrosion, oxidation



A. Special additive provides metal-adhesion qualities...keeps oil on parts whether hot or cold, running or idle.

B. Anti-oxidant resists deterioration of oil and formation of lacquer...prevents ring-sticking. Detergent keeps parts clean...helps prevent scuffing of cylinder walls.

C. Special compounds stop corrosion of any bushing or bearing metals and foaming in crankcase.

FREE CATALOG: "How to Save Money on Equipment Operation," a booklet full of valuable information, will be sent you on request to Standard Oil Company of California, 225 Bush St., San Francisco, Calif.

RPM DELO LUBRICATING OILS

FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your nearest distributor handling them, write or call any of the companies listed below.

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STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20 • STANDARD OIL COMPANY OF TEXAS, El Paso
THE CALIFORNIA OIL COMPANY, Barber, New Jersey • THE CALIFORNIA COMPANY, Denver 1, Colorado

Questions and Answers

Diesel-Electric Locomotives*

885-Q.—Why is this identification necessary?
A.—Since bearing shells are interchangeable when new, with the exception of the thrust bearing, identification marks are stamped on all shells to determine proper location.

886-Q.—Can new half shells be installed with an old half shell?
A.—A new bearing half shell may be installed with an old half shell providing the old remains in its original position.

887-Q.—What precaution shoud be observed?
A.—Once shells have established their bearing surfaces DO NOT MIX THEM UP.

888-Q.—What is the procedure for installing the crankshaft in the cylinder block?
A.—With cylinder block in the inverted position, clean and oil main journals of crankshaft. Install upper shells in saddle so that locking recess will be on the right side of engine. Lubricate bearing surface of upper bearing shells.

889-Q.—What operation should follow?
A.—Lift crankshaft with suitable slings and lifting blocks and lower the crankshaft on the bearing shells.

890-Q.—How are the upper bearing shells positioned?
A.—Position each upper bearing shell by placing a shell locating tool on the right main bearing stud bolt so that the dowel enters the dowel hole and the tongue enters the groove. Shift the shell until the lock recess of the shell enters the lock on the tool and then remove the tool.

891-Q.—What action should follow?
A.—Place the lower bearing shells in the cap, oil and apply. Make sure the two half shells align correctly with the lock on the cap.

892-Q.—What should be done previous to tightening up stud bolts, etc.?
A.—Lubricate all faces, seats and threads of stud bolts, caps and nuts with white lead and lube oil to prevent galling.

893-Q.—What is the final operation?
A.—Snug up all stud bolt nuts. Tighten nuts to about 100-ft.-lbs. torque (one man on two foot wrench), or with a power wrench.

894-Q.—How is bolt elongation measured?
A.—Loosen one nut, measure the overall free length with a stud elongation dial indicator, tighten to an elongation of .019 min. to .022 max. on dial indicator.

895-Q.—What must be done to permit removal of the split gear from the crank shaft without removing the crankshaft?
A.—The camshaft idler gear and bracket assemblies must be removed first.

896-Q.—What is the procedure for removal of the split gear?
A.—Unfasten and remove explosion covers. Remove base inspection covers adjacent to the split gear. Remove cotter pins and clamping ring bolts from split gear. Remove bolts and clamping rings.

897-Q.—What should follow?
A.—Remove one-half of the split gear, the other half, which is doweled to crankshaft, can be freed by tapping with a wooden mallet.

898-Q.—What inspection should be made of the split gear?
A.—Inspect the split gear for pitting, broken or chipped teeth and excessive wear. Magnaflux should be used if available.

899-Q.—When assembling the split gear to the crankshaft, how should it be positioned?
A.—The edge of the half doweled to the crankshaft and stamped *GEN. END* must face the generator.

900-Q.—How should the clamping ring bolts be applied?
A.—So that their heads will be in the direction of rotation of the shaft.

901-Q.—What operation is necessary at this time?
A.—Rotate the clamping ring so that the head and nut of the clamping ring bolt will clear the generator coupling bolt wrench when it is applied.

902-Q.—What procedure should be followed to correctly position the split gear to the crankshaft?
A.—Apply one crankshaft dowel (Gen. End) after coating with white lead. Apply the top half of the split gear, noting that the edge marked *GEN. END* is towards the generator.

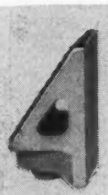
903-Q.—What should be done next?
A.—Apply the bottom half of the split gear and lightly tap in place.

904-Q.—What is the location of dowels between halves?
A.—They are mounted in the top half of the gear.

* This series of questions and answers relate specifically to the Alco-G.E. Diesel electric locomotives. The figure numbers and references, by number, to diagrams, etc., relate to the current edition of the Alco-G.E. operating and maintenance manual.

Why take the "hard way"?

when you can have:



Special Heat-Treated Alloy-Iron friction casting having 35 inches of friction-bearing surface.

easy to Assemble

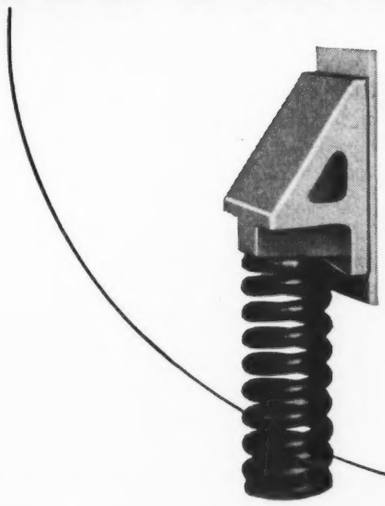
Spring-steel wear plate securely bolted or welded to the column.

easy to Dismantle

Friction-casting-supporting side-spring having a minimum ¾" initial compression.

easy to Service!

BARBER STABILIZED TRUCKS



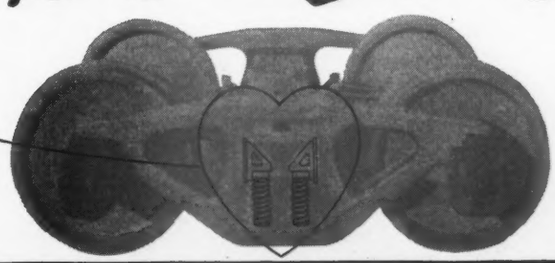
Barber Side Springs carry part of the load, thus increasing bolster spring capacity and reducing net cost.

Aside from the small number of parts used, this easy handling is due to the fact that Barber Stabilizer parts are freed when the bolster is raised off the springs.

Easy-Riding is another characteristic of Barber Stabilized Trucks, lessening the possibility of damage to car structure and lading.

More than 330,000 car sets of Barber Stabilized Trucks have been specified up to this time.

Mighty easy Riding.



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488

905-Q.—What should be the next operation?

A.—Apply the generator end ring clamp and position properly for bolt head and nut clearance. Snug up the clamping bolt nuts.

906-Q.—What should now be done?

A.—Apply the second crankshaft dowel (free end) and coat with white lead. Apply the free end clamping ring and tighten down both rings to 150 ft.-lbs.

907-Q.—Is it necessary that a gap shows at the split line?

A.—There must be a gap. The sum of both sides should not exceed .0038 in.

908-Q.—What about the tooth spacing?

A.—The tooth spacing should be checked at the split line with a tooth gauge.

909-Q.—What is the allowable tooth spacing?

A.—The spacing should be plus or minus .002 in.

910-Q.—What should be done if a tooth gage is not available?

A.—In this case an attempt should be made to equalize the gap to assure the correct spacing of the teeth adjacent to the split line. Loosen the clamping ring and tap the gear with a copper hammer to shift the gap.

911-Q.—What items must first be removed before attempting to remove vibration damper and extension shaft with engine in locomotive?

A.—Remove roof hatch from road units or removable hood from road switchers.

912-Q.—What items must be removed?

A.—Governor, turbosupercharger and support, remove grease cover and spring guide from Falk coupling between air compressor shaft and radiator fan drive shaft.

913-Q.—What should be done in connection with the air compressor?

A.—Loosen air compressor from base and slide it back from engine.

914-Q.—What operation should follow?

A.—Support crankshaft extension with hoist and rope looped around shaft. Remove the six capscrews fastening extension shaft to crankshaft.

915-Q.—What is the final operation to effect the removal?

A.—Slide extension shaft forward (towards air compressor) until dowel positioning extension shaft to vibration damper is clear, making sure vibration damper does not fall from crankshaft. Lift extension shaft free. Support vibration damper with hoist, free from crankshaft dowel hole and remove.

916-Q.—What is the procedure for removing crankshaft gear from extension shaft?

A.—Remove Falk couping hub. Remove timing gear from shaft. Remove oil slinger. Remove gear from extension shaft with jack screws applied in tapped holes provided in the gear hub.

917-Q.—What inspection should be made of the extension shaft?

A.—Inspect for pitting, broken or chipped teeth and excessive wear. Use Magnaflux equipment if available.

918-Q.—Describe the attention to be given the extension shaft?

A.—Clean and inspect thoroughly. Examine key and keyway of shaft and gear, being sure that the key is tight in shaft and no burrs exist.

919-Q.—What inspection should be made of the vibration damper?

A.—The vibration damper on locomotives being currently produced is completely sealed and requires no maintenance. On older locomotives the paddle type vibration damper should be disassembled, cleaned and surface inspected.

920-Q.—What is the first operation when applying gear to extension shaft?

A.—Fit key to keyway of gear and extension shaft with a maximum of .001 in. clearance. Apply key to extension shaft keyway with flat machine screws.

921-Q.—What should follow?

A.—Lubricate gear fit of extension shaft with white lead to prevent pick up. Heat gear in water bath, rust preventative added, at 212 deg. F, for approximately ½ hour.

922-Q.—What should finally be done?

A.—Remove gear from bath and fit on extension shaft. Tap gear hub with soft hammer to insure proper seating on the shaft flange. Allow gear to cool.

923-Q.—When installing extension shaft and vibration damper to crankshaft what is the procedure?

A.—Lift vibration damper and position to crankshaft flange by fitting dowel in dowel hole. Lift extension shaft and position, guided by the dowel, on the vibration damper. Tighten capscrews following a diagonal pattern.

924-Q.—What operation should follow?

A.—Using a dial indicator, check the shaft runout. It should not exceed .006 in. at a point just back of the tapered hub fit.

925-Q.—What must be done if these conditions are not satisfied?

A.—Loosen capscrews and shift extension shaft. Recheck after coupling to air compressor. The runout should be the same.

926-Q.—How should the capscrews be wired?

A.—They should be wired in pairs.

927-Q.—What are the functions of the oil slingers and catchers?

A.—To provide an oil seal between crankshaft extension and free end casing.

928-Q.—How are they applied?

A.—The bronze oil slinger is fastened to the crank-

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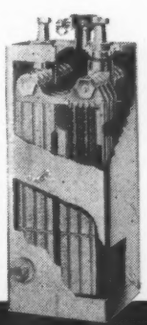

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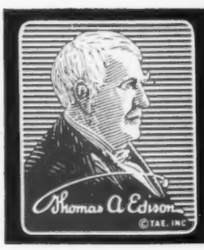

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shaft gear. The split aluminum catcher, fitting closely around the oil slinger, is mounted on the free end casing and turbosupercharger support.

929-Q.—How is the oil catcher removed?

A.—Slide timing gear partway down the shaft with a puller and remove the two capscrews fastening the two halves of the catcher. Remove tapered dowels positioning catcher on free end casing and turbo-support. Remove capscrews securing catcher to casing and support.

930-Q.—What is the procedure for removing oil slinger?

A.—Remove Falk coupling hub and timing gear from extension shaft. Remove capscrews and locking plates fastening oil slinger to crankshaft gear. Pull slinger from shaft.

931-Q.—What attention should the slinger and catcher receive?

A.—They should be cleaned and inspected.

932-Q.—What is the procedure for installing oil slinger?

A.—Apply capscrews and locking plates. Snug up capscrews. Center oil slinger on extension shaft using feeler gauge. Secure capscrews and lock with locking plates.

933-Q.—When installing oil catcher what should first be done?

A.—Reapply ⅛-in. circular gasket serving as a shim so that oil catcher will bear against a flat surface.

Interchange Rules

This is the third installment of a new series of questions and answers on the Association of American Railroads Code of Rules Governing the Condition of, and Repairs to, Freight and Passenger Cars for the Interchange of Traffic which may help car men clarify their understanding of the philosophy, intent and requirement of the Interchange Rules. The answers given to the questions are not to be considered interpretations of the rules of Interchange, which can only be rendered by the Arbitration Committee acting officially. The comments, however, will come from a background of intimate association with the application of the rules. Obviously, comments or opinions as of today, may be inapplicable after a revision of the rules or further interpretations by the Arbitration Committee.—Editor.

32-Q.—What credit should be allowed for 5½ by 10-in. axle removed from a foreign car having a cylindrical center and increased diameter wheel seats?

A.—Credit should be on basis of secondhand allowance as shown in Item 58 of Passenger Car Rule 22.

33-Q.—Is it proper to render jacking charge in accordance with Item 84 of Rule 107 where it is necessary to jack a car to apply rivets to Miner side castings or Symington-Gould cheek plates?

A.—Yes.

34-Q.—What credit should be allowed for an empty propane gas tank removed from a foreign car and replaced with a full tank?

A.—No credit is involved. The owner of the car from which the empty tank was removed should be contacted to determine the disposition desired. It is understood that all propane gas tanks bear serial numbers issued by the I.C.C. and registered in the name of the railroad to which assigned and that the individual railroad is responsible to the I.C.C. for tests and reports on all such cylinders. It is necessary, therefore, that each cylinder be returned to the railroad responsible for same.

35-Q.—Where defect card has been issued to cover paint damage on a tank car on account of having been submerged in a flood and it becomes necessary to clean the exterior so that same can be properly painted, may a charge be rendered for this operation?

A.—Labor charge for necessary cleaning and painting of exterior of tank car, including shell and underframe, in such cases, should be on the basis of actual time expended, chargeable in accordance with Item 92 of Rule 107.

36-Q.—Is the company issuing a defect card for paint and stenciling on a freight car damaged by fire responsible for repacking and reweighing expense where stenciling for these items has been burned off?

A.—The car owner should execute a joint inspection certificate for repacking and reweighing stenciling obliterated by fire and request from the company which issued the original defect card additional protection for repacking and reweighing car, provided such stencilings are obliterated from both sides of car.

37-Q.—Where specific per pound settlement prices are not provided in the Rules and settlement for a destroyed car is to be made on a reproduction cost basis, should the index figure for the year prior to date car is destroyed be used instead of index figure for the same year?

A.—Yes.

38-Q.—Is it proper to include additional allowances for AB brakes, one-wear wrought-steel wheels, etc., where settlement for destroyed car is made on reproduction cost basis rather than per pound basis, when such items were included in the original cost of the car?

A.—No.

39-Q.—Where center and side sills have buckled to the extent that underframe of car rests on ties of tracks, would this be considered as constituting a derailment within the intent of Paragraph (10-a) of Rule 32?

A.—No.

40-Q.—Where the roof of a car is damaged by a falling tree, is the handling line responsible?

A.—Yes. Such damage is considered comparable to the conditions specified in Paragraph (10-j) of Rule 32.

41-Q.—Where secondhand U-section truck side frame is substituted for T-section truck side frame broken in derailment, is it proper to render bill versus car owner for difference between secondhand value of U-type truck side applied and secondhand value of T-type truck side removed?

A.—Yes.

42-Q.—After the 90-day period, Rule 98, Paragraph (c-3), is the car owner responsible for scrap axle due to long journal or small journal diameter?

A.—Yes.

43-Q.—With reference to "Note" following paragraph (c-3) of Rule 98, may car owner take joint evidence on axle removed with scrap wheel seat or center diameter? If so, may the car owner use joint evidence against a foreign road that applied the axle over one year from date of joint evidence?

A.—Yes.

This month Dr. Oscar Horger demonstrates that full line contact is one reason why:

The taper makes TIMKEN® the only journal bearing that delivers what you expect when you buy a roller bearing

THERE are only two reasons why railroads put journals on roller bearings: (1) to end the hot box problem and (2) to cut operation and maintenance costs to a minimum. The *only* bearing you can count on to do both is the Timken® tapered roller bearing. Here's why: 1) *Positive roller alignment.* The taper keeps roller ends snug against the rib, where wide area contact keeps rollers properly aligned. No skewing of rollers to upset the full line contact, shorten the life of the bearing.

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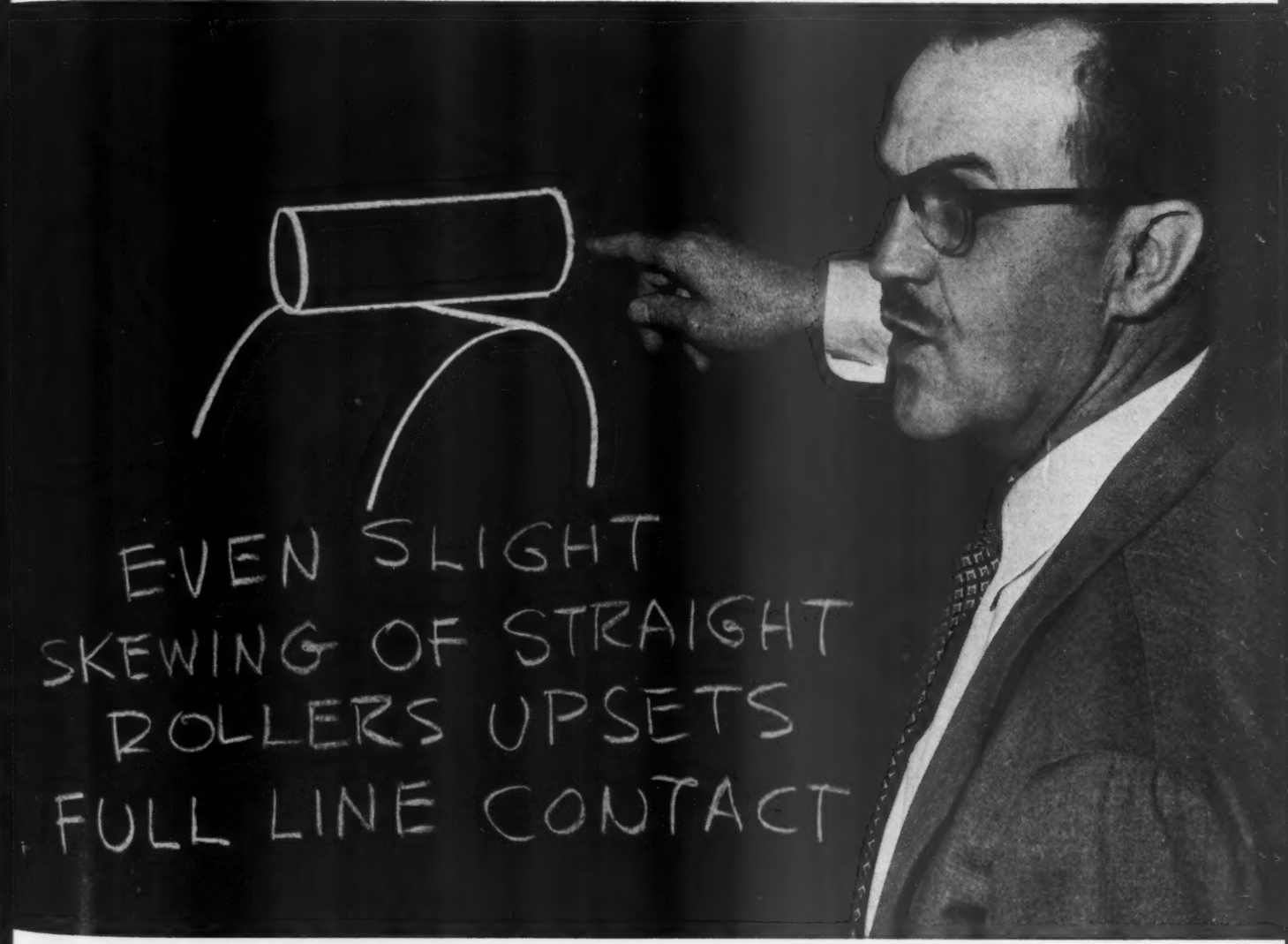
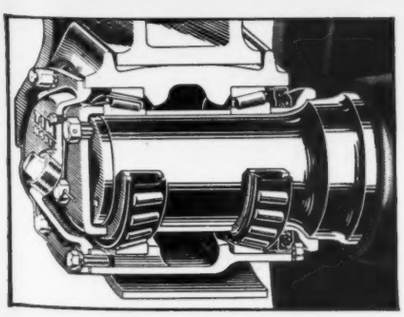
Timken bearings always *roll* the load, never slide it. The taper prevents lateral movement, lets them take the thrust. There's no scuffing or pumping action. This helps end the hot box problem. It means less maintenance, less lubricant, longer bearing life.

Timken is the only journal bearing you can fully count on to end the hot box problem and cut operation and maintenance costs to a minimum —it's the taper! Get what you pay for. Get Timken *tapered* roller bearings. The Timken Roller Bearing Company, Canton 6, Ohio.





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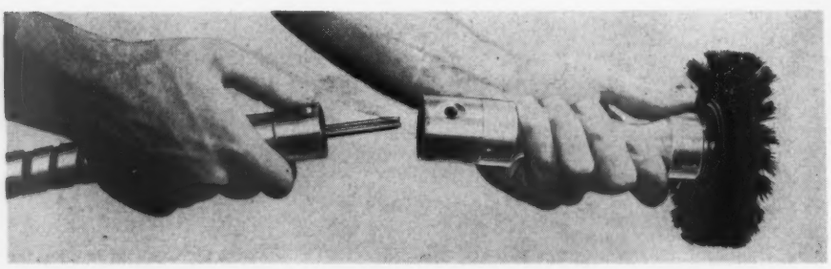
NEW DEVICES

Cleaning Diesel Trucks

The Sellers Injector Corporation, 1600 Hamilton street, Philadelphia 30, Pa., has recently introduced a 6,000-gal. per hr. high-pressure jet cleaner for diesel locomotive trucks. This unit operates on 50 lb. or more of steam and produces a discharge pressure of 200 lb., with temperatures up to 190 deg. F. When desired, detergent may be used up to 10 per cent of the jet volume. The high-pressure jet of steam and hot water is conducted to upright pipes and discharged through a series of spray nozzles, which permit thorough cleaning of inaccessible spots on the trucks of cars, and diesel locomotives of all types.

For cleaning the tops of fuel oil tanks, a smaller Sellers high-pressure cleaner of 600-gal. capacity is available. It may be located conveniently with respect to the other cleaning facilities and equipped with a short hose and single nozzle which permits the operator to flush off thoroughly all dirt, oil, or grease residue lodged in the restricted space above fuel tanks.



Quick Change Handpiece

Recently introduced by the Franklin Balmar Corporation, N. A. Strand Division, Baltimore 11, Md., is its quick change handpiece for Strand Flexible Shaft Machines. This device is said to eliminate the need for any tools in changing working attachments affixed to the end of the flexible shaft.

The handpiece is fitted with a spring lock retaining button. To change the handpiece, the operator presses the button, pulls the entire handpiece and permanently affixed tool away from the shaft. Then, a new handpiece and tool can be snapped into place.

The device is standard equipment on all Strand machines presently equipped with No. 6 handpiece or smaller. In addition, it will be standard for their new high speed attachment.

Angle Head Attachment

An angle head attachment for use with electric Impactools has been announced by the Ingersoll-Rand Company, 11 Broadway, New York 4. It is available in two sizes, one for use with ½ in. square drivers and the other for ⅝ in. square drivers.

The attachment is designed to aid workers reach hard-to-get-at nuts and bolts. It snaps on the Impactool like a socket wrench and can be rotated 360 deg. Ball and needle bearings are used throughout and its bevel gears are made of heat-treated steel. A die cast aluminum housing keeps weight to a minimum. Height of the unit is 3 in. and overall length is 6¼ in.

Explosion-Proof Hand Lamp

An explosion-proof, 100-watt rain-tight hand lamp which weighs 4¾ lb. has been introduced by Crouse-Hinds Company, Syracuse, New York. The globe guard, globe-holder, and cord connector housing of the lightweight lamp (type EVH 103) are aluminum. The lamp receptacle housing which was aluminum on earlier models, has been replaced by one made of a lightweight high-impact molded phenolic composition. Phenolic bone fibre, another

(*Continued on page 103*)

Add *modern* bearings to *modern* power . . .

and watch those FREIGHT cars roll!

With modern diesels providing the power, railroads are carrying more freight than ever before . . . and on faster schedules. But, the advantages of diesel power are wasted every time one of your fast freights is delayed by a hot box! That's where Hyatt enters the picture—to save you money and safeguard your profits! When freight cars are equipped with Hyatt Roller Bearing Journal Boxes, modern bearings will team with modern power . . . and the "hot box" problem can be eliminated. Your freight trains will highball along without stops for journal box inspections . . . free from "hot box" delays . . . moving mountains of merchandise quickly and safely! Let us show you the economics of "Hyatts for Freight" as applied to integral side frame or pedestal-type boxes, for changeovers or new equipment. Write to Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

running mate of diesel freight

HYATT

Roller Bearing Journal Boxes

NEWS

Shop Construction

Chesapeake & Ohio.—Directors have approved expenditure of $1,400,000 to reconvert the Huntington, W. Va., shops according to plans devised by a group of employees at the shops. It is estimated the project will cut operating costs by $750,000 a year. The employees prepared a 225-sq.-ft., three-dimensional model, with movable parts, which they brought to New York—at the invitation of Walter J. Tuohy, C&O president—to aid in presentation of their reconversion plan to the board at its regular monthly meeting in November.

Under the employees' plan, the Huntington shop will be concerned mainly with diesels, but all passenger-car repairs for the entire C&O system can be done there.

The reconversion plan was drawn up without the usual authorization. Mr. Tuohy saw the model in Huntington and was so impressed he gave the workers permission to start reconversion of part of the shop.

Louisville & Nashville.—Additional diesel fuel and diesel maintenance facilities will be built at various points at an approximate cost of $300,000.

A.S.W. President Re-elected

FRED L. PLUMMER, director of engineering, Hammond Iron Works, Warren, Pa., has been re-elected president of the American Welding Society for 1953-54.

Trade Publications

NICKEL ALLOYS. International Nickel Company, 67 Wall street, New York 5. 34-page booklet describes and illustrates use of nickel and nickel alloy steels, in forged, rolled and cast form, for motive power, rolling stock, and track work.

■

POP SAFETY AND RELIEF VALVES. Lunkenheimer Company, Cincinnati 14. 12-page, two-color Circular No. 502 illustrates Lunkenheimer line of pop safety and relief valves for steam, air, gas, water, oil and other liquids. Gives data in the form of steam, air and gas relieving capacity tables and tables of multipliers to compute relieving capacities at various inlet temperatures and relieving capacities for air valves for use in handling gases and vapors.

■

RAILROAD CLEANERS AND PROCEDURES. Wyandotte Chemicals Corporation, Railroad Sales Department, Wyandotte, Mich. 50-page, 8½-in. by 11-in. booklet details products and procedures for cleaning diesel and steam locomotives, passenger and freight cars, paint stripping, and miscellaneous railroad maintenance jobs.

ALLYN C. BREED has been appointed assistant director of the Bureau of Locomotive Inspection of the Interstate Commerce Commission. Mr. Breed was originally appointed to the bureau, then known as the Bureau of Locomotive Boiler Inspection, on August 1, 1911. He was born in Peoria, Ill., in 1882, and worked for the Peoria & Pekin Union and the Chicago & Alton from 1898.

SELECTED MOTIVE POWER AND CAR PERFORMANCE STATISTICS

FREIGHT SERVICE (DATA FROM I.C.C. M-211 AND M-240)

Item No.		Month of July 1953	Month of July 1952	7 months ended with July 1953	7 months ended with July 1952
3	Road locomotive miles (000) (M-211):				
3-05	Total, steam	12,532	13,782	87,473	120,928
3-06	Total, Diesel-electric	32,004	26,667	215,947	185,541
3-07	Total, electric	716	647	5,153	5,301
3-04	Total, locomotive-miles	45,322	41,143	309,004	311,922
4	Car-miles (000,000) (M-211):				
4-03	Loaded, total	1,646	1,429	11,592	11,192
4-06	Empty, total	968	843	6,372	6,204
6	Gross ton-miles-cars, contents and cabooses (000,000) (M-211):				
6-01	Total in coal-burning steam locomotive trains	22,296	21,388	156,034	212,457
6-02	Total in oil-burning steam locomotive trains	6,767	7,654	42,466	56,748
6-03	Total in Diesel-electric locomotive trains	87,946	70,811	603,143	510,149
6-04	Total in electric locomotive trains	1,969	1,749	14,561	14,715
6-06	Total in all trains	119,184	101,754	817,652	794,666
10	Averages per train-mile (excluding light trains) (M-211):				
10-01	Locomotive-miles (principal and helper)	1.03	1.03	1.03	1.03
10-02	Loaded freight car-miles	39.40	37.60	40.70	39.30
10-03	Empty freight car-miles	23.10	22.20	22.30	21.80
10-04	Total freight car-miles (excluding caboose)	62.50	59.80	63.00	61.10
10-05	Gross ton-miles (excluding locomotive and tender)	2,850	2,679	2,870	2,789
10-06	Net ton-miles	1,285	1,180	1,300	1,276
12	Net ton-miles per loaded car-mile (M-211)	32.60	31.40	32.00	32.50
13	Car-mile ratios (M-211):				
13-03	Per cent loaded of total freight car-miles	63.00	62.90	64.50	64.30
14	Averages per train hour (M-211):				
14-01	Train miles	18.00	17.90	18.20	17.60
14-02	Gross ton-miles (excluding locomotive and tender)	50,641	47,356	51,676	48,616
14	Car-miles per freight car day (M-240):				
14-01	Serviceable	45.40	40.00	45.60	44.10
14-02	All	43.20	37.80	43.40	41.90
15	Average net ton-miles per freight car-day (M-240)	888	746	896	876
17	Per cent of home cars of total freight cars on the line (M-240)	46.00	48.40	46.70	44.20

PASSENGER SERVICE (DATA FROM I.C.C. M-213)

3	Road motive-power miles (000):				
3-05	Steam	4,531	6,326	31,938	50,360
3-06	Diesel-electric	21,207	19,481	140,132	128,626
3-07	Electric	1,560	1,624	10,838	11,427
3-04	Total	27,298	27,431	182,908	190,420
4	Passenger-train car-miles (000):				
4-08	Total in all locomotive-propelled trains	279,278	276,004	1,844,678	1,894,929
4-09	Total in coal-burning steam locomotive trains	23,654	30,355	181,254	260,057
4-10	Total in oil-burning steam locomotive trains	19,180	26,274	107,379	180,820
4-11	Total in Diesel-electric locomotive trains	219,549	201,875	1,435,521	1,327,647
12	Total car-miles per train-miles	9.95	9.81	9.78	9.75

YARD SERVICE (DATA FROM I.C.C. M-215)

1	Freight yard switching locomotive-hours (000):				
1-01	Steam, coal-burning	592	554	4,200	5,720
1-02	Steam, oil-burning	112	154	786	1,162
1-03	Diesel-electric	3,547	2,848	23,928	21,507
1-06	Total	4,269	3,579	29,057	28,553
2	Passenger yard switching hours (000):				
2-01	Steam, coal-burning	20	23	148	205
2-02	Steam-oil-burning	7	10	47	78
2-03	Diesel-electric	261	260	1,794	1,791
2-06	Total	320	326	2,214	2,307
3	Hours per yard locomotive-day:				
3-01	Steam	7.00	5.30	6.70	6.80
3-02	Diesel-electric	16.40	14.30	16.30	16.00
3-05	Serviceable	15.10	12.80	14.90	14.10
3-06	All locomotives (serviceable, unserviceable and stored)	13.50	10.70	13.10	12.10
4	Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.80	1.75	1.73	1.77
5	Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives)	0.71	0.73	0.74	0.75

[1]Excludes B and trailing A units.

SUPPLY TRADE NOTES

AMERICAN LOCOMOTIVE COMPANY.—*W. G. Lockwood* has been named district manager, southeastern sales district; *Ralph M. Darrin, Jr.*, and *Richard K. McCoy* were named assistants to *W. A. Callison*, vice-president in charge of eastern regional sales, with headquarters at 30 Church street, New York; and *H. M. Short* has been appointed assistant to *G. P. Link*, manager of renewal parts sales, at Schenectady.

A one-story warehouse and office building will be constructed by the American Locomotive Company in St. Louis, Mo. The structure will serve as a diesel locomotive parts storage depot in the southwest, and space will be available for the district sales staff. The warehouse will be 120 ft. by 240 ft., with an overall area of 30,000 sq. ft. Provision will be made for the addition of storage area and for the possible erection of a diesel engine and locomotive component rebuild and repair shop. The warehouse will be built of structural steel with asbestos-coated steel sheathing; the offices, of sash and brick construction. The latter will be air conditioned. The building, which is expected to be completed late next spring, will cost approximately $400,000.

■

BUFFALO BRAKE BEAM COMPANY. — *Stephen G. Peterson* has been appointed sales engineer, Southeastern territory. Mr. Peterson, a former car department superintendent of the Seaboard Air Line, was field service representative for Pullman-Standard Car Manufacturing Company in the northeastern states before his association with Buffalo Brake Beam as sales engineer.

S. G. Peterson

■

BARBER-COLMAN COMPANY. — The automatic Control and Uni-Flo divisions of Barber-Colman have opened two new factory branch offices, one at 1537 Central avenue, Indianapolis, in charge of *Don Horock*, and the other at 1245 South 13th street, Omaha, in charge of *Tom Peterson*.

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE NOVEMBER ISSUE

DIESEL-ELECTRIC LOCOMOTIVES

Road	No. of units	Horsepower	Service	Builder
Alaska	6[1]	1,500		General Motors
Norfolk Southern	3[2]	1,600		Baldwin-Lima-Hamilton

FREIGHT-CAR ORDERS

Road	No. of cars	Type of car	Builder
Atchison, Topeka & Santa Fe	100[3]	70-ton covered hopper	Pullman-Standard
Canadian National	1,400	50-ton box	National Steel Car
	210	70-ton hopper	National Steel Car
	1,200	50-ton box	Canadian Car & Fdry.
	120	50-ton Hart convertible	Canadian Car & Fdry.
	100	30-ton flat	Canadian Car & Fdry.
	250	50-ton box	Eastern Car Co.
	500	70-ton gondola	Eastern Car Co.
	300	70-ton topper	Eastern Car Co.
	100	30-ton box	Eastern Car Co.
	200	70-ton covered hopper	Marine Industries, Ltd.
Grand Trunk Western	100	50-ton box	American Car & Fdry.
	100	70-ton flat	American Car & Fdry.
	200	70-ton gondola	General American
Chicago & North Western	30[4]	50-ton box	American Car & Fdry.
Fruit Growers Express Co.	280[5]	50-ton refrigerator	Pacific Car & Fdry.
Illinois Central	1,500[6]	50-ton box	Company shops
Maine Central	40[7]	50-ton pulpwood	Bethlehem Steel
Southern	1	150-ton flat	Company shops
	1	125-ton flat	Company shops
Spokane, Portland & Seattle	500[8]	Box	Company shops
Union Tank Car Co.	500	50-ton tank	Company shops
Western Maryland	250[9]	70-ton gondola	Bethlehem Steel

PASSENGER-CAR ORDERS

Road	No. of cars	Type of car	Builder
Atlantic Coast Line	2[10]	Sleeping	Pullman-Standard
Chicago & Eastern Illinois	2[10]	Sleeping	Pullman-Standard
Chicago & North Western	16[11]	Gallery type, double-deck	St. Louis Car
Louisville & Nashville	1[10]	Sleeping	Pullman-Standard
Nashville, Chattanooga & St. Louis	2[10]	Sleeping	Pullman-Standard

[1] To cost $1,021,703. For December delivery.
[2] Approximate cost, $465,000. When deliveries are completed early next year, dieselization of the road will be completed.
[3] For delivery in mid 1954.
[4] Delivery scheduled for second quarter of 1954. Estimated cost, $7,900 each.
[5] Deliveries scheduled to begin next March.
[6] Materials ordered. Construction to begin in March, 1954.
[7] For December delivery. Approximate cost, $6,900 each.
[8] To cost over $3,000,000. Cars to be lined with Fiberglas.
[9] To be equipped with Nailable Steel flooring. Delivery scheduled to begin in March, 1954.
[10] To cost about $195,000 each. For "Dixie Flagler" service between Chicago and Miami late next year.
[11] Approximate cost, $2,240,000. Deliveries expected late in 1954.

NOTES: *Florida East Coast.*—The FEC has petitioned the court for authority to purchase two sleeping cars for the "Dixie Flagler" service between Chicago and Miami. Tentative plans for purchase of new passenger cars and modernization of existing cars for use in the Long Island's electrified commuter territory contingent upon a fare increase. The rolling stock modernization program which the proposed fare increase is intended to finance, in part, would include purchase of 112 new cars, full rehabiliitation of 558 existing cars, and retirement of 431 of the railroad's oldest cars. The new cars, estimated to cost about $125,000 each, would be similar to 20 now being received from the Pullman-Standard Car Manufacturing Company. The rehabilitated cars would be completely rebuilt, with roller-bearing trucks, rubber-cushioned coupler mountings, forced-draft ventilation, complete insulation, brighter lighting, new foam-rubber seats and centralized door controls.

Missouri Pacific.—The Missouri Pacific has been authorized by the Federal District Court to purchase 66 diesel units at a cost of approximately $10,731,000. Of the total order 48 units will be assigned to the MP and nine each to the Gulf Coast Lines and the International-Great Northern. The order will complete dieselization of the two subsidiaries and increase MP diesel operations to about 74 per cent.

Piedmont & Northern.—Directors of the P&N have approved a plan to complete dieselization of the road's motive power by replacing the electric locomotives now operating on the North Carolina division. Conversion to full diesel operation will involve expenditure of about $1,000,000 for new motive power and diesel shop facilities. It has not yet been determined how many units will be ordered.

FINE ORGANICS, INC.—The *James A. Galligan Company*, 2246 East 73rd street, Chicago 49, has been appointed midwest representative and railroad consultant on Fine Organics safety solvents and cleaning materials. Galligan, in turn, has appointed the following agents in the middle west: *F. H. Bathke Company*, 490 North Snelling avenue, St. Paul 1, and *Charles V. Kray*, 1600 West Good Hope Road, Milwaukee 9.

■

TUCOLITH SALES CORPORATION.—*E. B. Colven* has been appointed sales engineer at New York. Mr. Colven was formerly with the Ellcon Company, in charge of development and research in connection with railway specialties.

■

MINNEAPOLIS - HONEYWELL REGULATOR COMPANY.—*William E. Reagan* has been named transportation sales engineer of the transportation division at Philadelphia, and *Forrest Erickson* has been assigned to engineering duties on transportation control systems. Formerly both were with other Honeywell divisions in Philadelphia.

■

GENERAL AMERICAN TRANSPORTATION CORPORATION.—Eastern headquarters for all divisions of General American are now located in the 380 Madison Avenue building, New York.

PARKER-KALON CORPORATION. — General American has acquired the screw-fastening devices business and assets of Parker-Kalon.

■

BARBER-GREENE COMPANY.—*Edward J. Curtain*, field engineer, has been appointed northeastern area sales manager, at Boston.

■

NEW YORK AIR BRAKE COMPANY; KINNEY MANUFACTURING COMPANY.—Stockholders of the New York Air Brake Co., Kinney Manufacturing Co., a subsidiary,

have been asked to vote on a plan to merge the companies. Kinney would retain its identity and continue to function as an independent unit with its own manufacturing and sales organization.

■

ROBERTSHAW-FULTON CONTROLS COMPANY.—*R. M. Stotsenburg* has been appointed sales manager of Fielden Instrument division. Mr. Stotsenburg was formerly with R.C.A. Victor division.

■

OHMITE MANUFACTURING COMPANY.—The offices of Ohmite have been moved to its newly completed, air-conditioned plant at 3601 Howard street, Skokie, Ill.

■

TIMKEN ROLLER BEARING CO.—*George W. Curtis*, Milwaukee division sales manager of the Timken Roller Bearing Company, has retired. Responsibility for the Milwaukee Industrial Sales Division has been divided among district offices in that city, Minneapolis and Moline.

■

WESTINGHOUSE AIR BRAKE COMPANY, AIR BRAKE DIVISION.—*H. W. Wiss*, assistant manager western district, Chicago, has been appointed manager of the district,

H. W. Wiss

succeeding T. W. Masterman, deceased. *D. T. Kerr*, on the commercial engineering staff at Wilmerding, has been transferred to Chicago as a representative.

Carlton D. Stewart, who retired as vice-president of engineering, Air Brake Division, last May, has severed active connection with Westinghouse. Since May Mr. Stewart had acted as advisor and consultant on special projects.

■

AMERICAN WHEELABRATOR & EQUIPMENT CORP.—*Leroy J. Wieschaus* has been appointed district manager of the company's sales office at 805-6 Farley building, Birmingham, Ala. Mr. Wieschaus was previously abrasives engineer.

■

CLARK EQUIPMENT COMPANY.—Under a new dealer organization plan, Clark dealers in the midwest will add Ross straddle carriers and fork trucks to their regular sales and service activities. Clark acquired the Ross Carrier Company earlier this year.

SUMMARY OF MONTHLY HOT BOX REPORTS

	Foreign and system freight car mileage (total)	Cars set off between division terminals account hot boxes			Miles per hot box car set off between division terminals
		System	Foreign	Total	
July, 1950	2,745,932,894	.....	.....	23,957	114,619
August, 1950	2,937,455,020	7,422	15,490	22,912	128,206
September, 1950	2,974,297,739	6,541	12,881	19,422	153,141
October, 1950	3,165,997,915	4,343	8,935	13,278	238,439
November, 1950	2,868,871,913	2,536	5,331	7,867	364,672
December, 1950	2,813,042,212	2,278	5,968	8,246	341,140
January, 1951	2,840,847,511	2,870	8,436	11,306	251,269
February, 1951	2,425,226,454	4,528	14,063	18,591	130,452
March, 1951	3,063,173,942	3,667	10,078	13,745	222,857
April, 1951	2,996,562,763	3,702	8,914	12,616	237,521
May, 1951	3,013,634,782	5,631	13,737	19,368	155,599
June, 1951	2,874,873,495	7,074	15,376	22,450	128,057
July, 1951	2,768,920,095	8,886	18,823	27,709	99,929
August, 1951	3,009,371,111	9,023	19,092	28,115	107,038
September, 1951	2,925,570,545	6,472	13,565	20,037	146,008
October, 1951	3,116,490,095	4,131	9,053	13,184	236,384
November, 1951	2,939,503,144	2,022	4,405	6,427	457,368
December, 1951	2,752,316,133	2,130	5,398	7,528	365,611
January, 1952	2,824,298,630	3,208	7,197	10,405	271,437
February, 1952	2,809,162,671	2,723	6,473	9,196	305,477
March, 1952	2,943,812,727	2,594	5,877	8,471	347,517
April, 1952	2,766,313,714	3,826	7,759	11,585	238,784
May, 1952	2,918,508,445	6,020	10,938	16,958	172,102
June, 1952	2,672,512,889	8,466	14,495	22,961	116,394
July, 1952	2,575,298,912	10,566	15,833	26,399	97,553
August, 1952	2,924,917,122	11,658	17,535	29,193	100,192
September, 1952	2,931,129,734	7,536	13,608	21,144	138,627
October, 1952	3,093,990,289	4,058	8,053	12,111	255,469
November, 1952	2,984,101,808	2,198	4,501	6,699	445,455
December, 1952	2,869,928,617	1,742	3,632	5,374	534,040
January, 1953	2,828,906,282	2,219	4,123	6,342	446,059
February, 1953	2,625,563,462	2,111	4,059	6,170	425,537
March, 1953	2,904,227,804	2,696	6,077	8,769	331,192
April, 1953	2,850,752,648	3,383	6,435	9,818	290,359
May, 1952	3,013,610,843	5,892	11,433	17,325	173,945
June, 1952	2,672,512,889	8,466	14,495	23,833	116,394
July, 1952	2,925,317,024	9,342	15,775	25,117	116,467
August, 1952	2,971,020,484	8,638	14,160	22,798	130,319

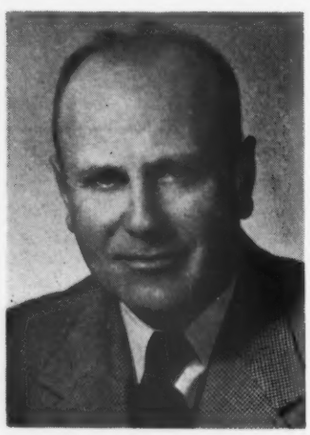
RAIL FLANGE LUBRICATOR COMPANY.—*Chester A. Olsen* appointed midwestern sales representative, with headquarters at 316 South LaSalle Street, Chicago.

■

WESTINGHOUSE ELECTRIC CORPORATION. *C. M. Laffoon*, manager of the generator engineering department, has been appointed assistant manager of the transportation and generator division.

■

MAGNUS CHEMICAL COMPANY.—*Roy D. King* has been elected a vice-president, in



R. D. King

charge of railroad sales and development. Mr. King has been manager of the Railroad Division for the past five years.

■

GRAYBAR ELECTRIC COMPANY.—A new Graybar branch has been opened at Springfield, Ill. *Harry Bryson* has been appointed manager, and *C. W. Kraich* operating manager.

GENERAL MOTORS CORPORATION, ELECTROMOTIVE DIVISION.—*J. E. Hacker* has been appointed manager of Plant No. 3 at Cleveland, and *R. L. Terrell*, works manager at LaGrange, Ill.

Obituaries

T. W. MASTERMAN, manager of the western district of the Westinghouse Air Bake Company, Air Brake Division, at Chicago, died on October 23.

PERSONAL MENTION

Atchison, Topeka & Santa Fe

ROSTON TUCK, master mechanic at Los Angeles, Cal., has retired.

W. L. HUEBNER, superintendent of shops at Barstow, Cal., appointed master mechanic at Los Angeles, Cal.

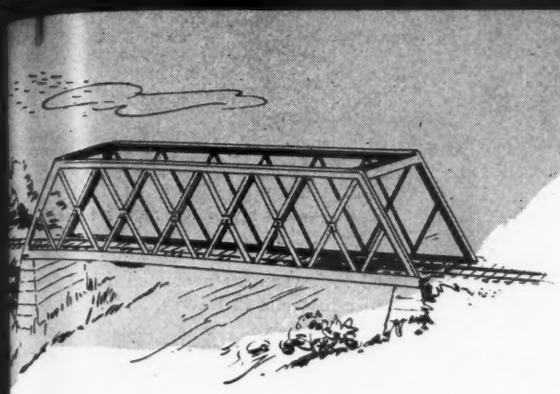
DELBERT L. QUANEY, assistant superintendent of shops at San Bernardino, Cal., appointed superintendent of shops at Barstow, Cal.

LYLE B. ENGLISH, general foreman at Barstow, Cal., appointed assistant superintendent of shops at San Bernardino, Cal.

J. D. SWAUGER, assistant night roundhouse foreman at Barstow, Cal., appointed general foreman at Barstow.

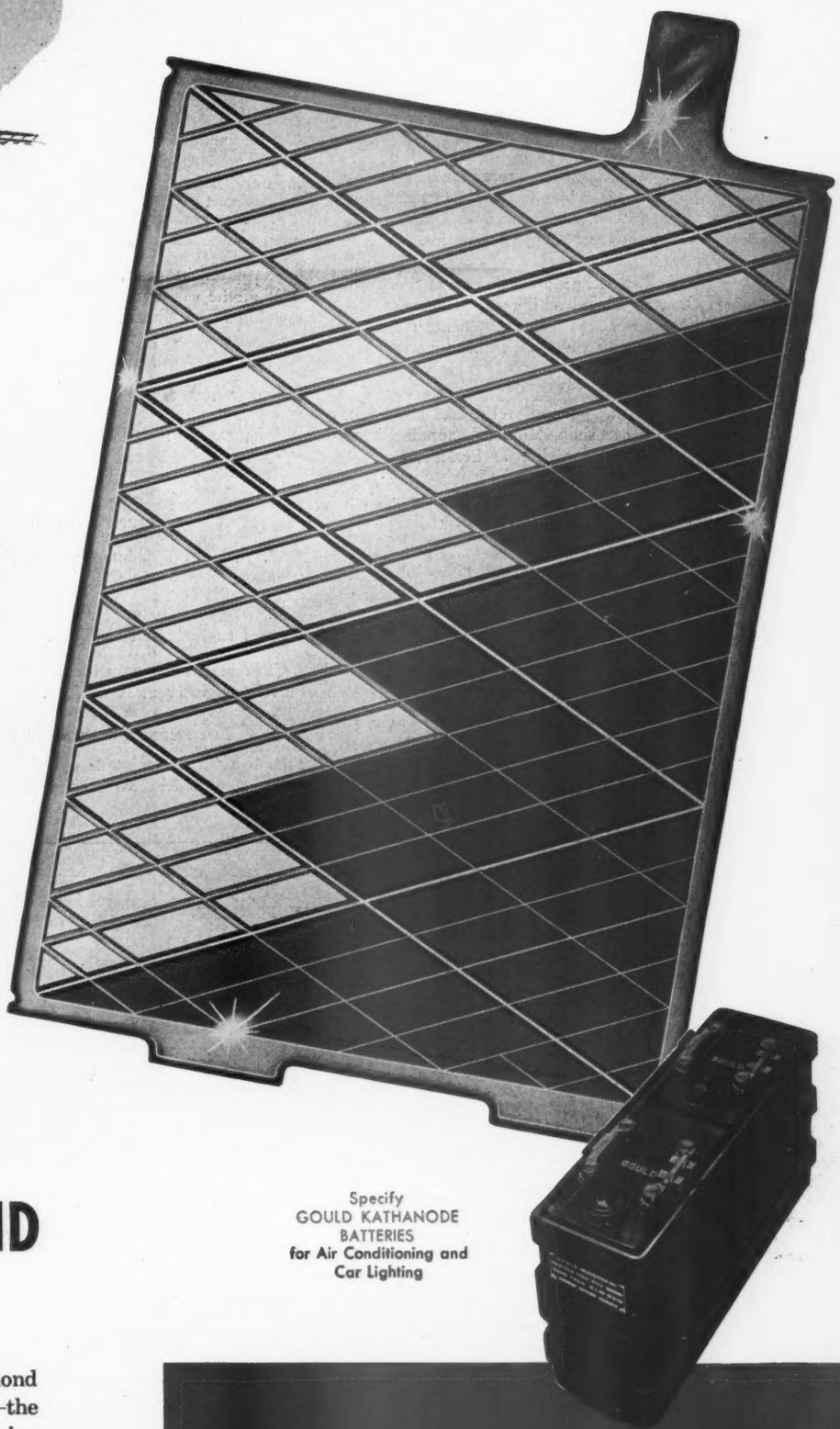
G. M. LAWLER, master mechanic at Chanute, Kan., has retired.

(*Continued on p. 102*)



BUILT LIKE A BRIDGE FOR *Rough Tough Service*

New GOULD DIAMOND "Z" GRID



Specify
GOULD KATHANODE
BATTERIES
for Air Conditioning and
Car Lighting

Look at this illustration of Gould's new Diamond "Z" Grid. See the bridge-type construction—the husky diamond shaped active material retaining members. Note the *extra* large conductive members which not only conduct current to the lug with high efficiency but give still more strength to this most recent achievement of the famous Gould Laboratories.

Here's a grid that's built for rough, tough service, top performance and long life. Years ahead of requirements, it has *extra* strength for every application, *extra* ruggedness to withstand abuse, *extra* ability to deliver full power longer. Now more than ever—when you buy, buy Gould!

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GOULD

RAILROAD BATTERIES

GOULD-NATIONAL BATTERIES, INC.
Trenton 7, N. J.

Always Use Gould-National Automotive and Truck Batteries

Canadian National

RICHARD BABB, acting superintendent of motive power and car equipment, Montreal district, appointed superintendent of motive power and car equipment, Montreal district.

L. S. MCGREGOR, superintendent motive power and car equipment, Northern Ontario district at North Bay, Ont., temporarily assigned to special duties.

R. R. RISK, general foreman at Stratford, Ont., appointed acting superintendent motive power and car equipment, Northern Ontario district, with headquarters at North Bay, Ont.

P. KEIR, general foreman, Point St. Charles car shop, Montreal, appointed superintendent car shop at Leaside, Ont.

J. B. DUNLOP, superintendent car shop at Leaside, Ont., has retired.

Chesapeake & Ohio

S. M. EHRMAN, assistant supervisor work simplification, appointed general car foreman at Columbus, Ohio.

Chicago, Milwaukee, St. Paul & Pacific

A. W. HALLENBERG, master mechanic at Deer Lodge, Mont., appointed district master mechanic, with headquarters at Chicago.

G. J. JOHNSTON, master mechanic at Spokane, Wash., appointed district master mechanic, with headquarters at Deer Lodge, Mont.

L. H. RABUN, master mechanic at Miles City, Mont., has had jurisdiction extended from Aberdeen, S. D., to Harlowton, Mont., including Lewistown and Great Falls.

J. A. DEPPE, superintendent car department at Milwaukee, has retired.

FRANK A. SHOULTY, assistant superintendent of the car department at Milwaukee, appointed superintendent car department.

Georgia & Florida

L. J. WATERS, acting superintendent motive power, appointed superintendent motive power, with headquarters at Douglas, Ga.

New York Central

MANAGEMENT SERVICES

W. E. ILLIC appointed assistant industrial engineer at New York.

R. W. MUSTARD appointed assistant industrial engineer at New York.

C. F. SCHUMANN appointed assistant industrial engineer at New York.

EQUIPMENT DEPARTMENT

R. G. GELLY appointed supervisor of air brakes and steam heat at New York.

B. O. BREON appointed air brake inspector at New York.

C. G. MARKS appointed road foreman of engines at Buffalo.

H. F. LEVERNOSH appointed diesel locomotive inspector at DeWitt, N. Y.

Y. Z. WOERNER appointed diesel locomotive inspector at Buffalo.

C. W. FERGUSON appointed general foreman at Detroit.

Seaboard Air Line

A. A. OSTEEN, JR., appointed supervising electrician, with headquarters at Jacksonville, Fla.

Southern

System divided into two mechanical territories:

L. C. SHULTS, superintendent motive power at Knoxville, Tenn., appointed superintendent motive power, with jurisdiction over Knoxville, Coster, Memphis, Ludlow, Danville, Huntingburg, Chattanooga, Birmingham, Meridian and New Orleans shop territories. Headquarters, Knoxville.

H. C. TREXLER, superintendent motive power at Charlotte, N. C., appointed superintendent motive power with jurisdiction over Alexandria, Spencer, Ashville, Columbia, Charleston, Hayne, Atlanta and Macon shop territories. Headquarters, Charlotte.

Position of superintendent motive power at Cincinnati abolished.

PAUL T. HOSKINS, JR., appointed general foreman diesels at Sevier Yard, Knoxville, Tenn.

DEWEY F. BULLARD appointed assistant foreman car repairs, Coster shop, Knoxville, Tenn.

Texas & Pacific

J. O. FRAKER, electrical engineer and diesel supervisor, appointed superintendent diesel and electrical maintenance, a newly created position, with headquarters at Dallas, Tex.

Virginian

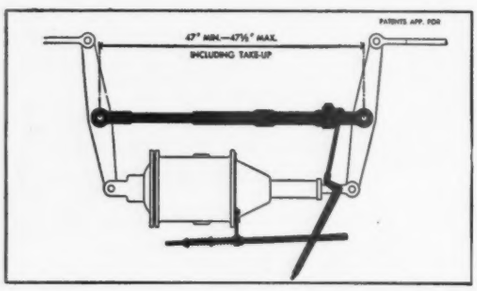
G. T. STRONG, JR., general mechanical and air-brake inspector at Princeton, W. Va., appointed master mechanic, New River division, with headquarters at Elmore, W. Va.

JOHN MARCROFT, supervisor of boilers and welding, appointed general mechanical and air brake inspector, with headquarters at Princeton, W. Va. Former position abolished.

PERSONAL MENTION—Obituary

M. D. STEWART, superintendent of motive power of the Southern at Cincinnati, Ohio, died on September 7.

The Franklin Automatic Brake Slack Adjuster is fully automatic in maintaining the predetermined travel of the brake cylinder piston. Operating on the pawl and ratchet principle, it has sufficient take-up so that no manual adjustment is required during the life of the brake shoes. It replaces, or is installed in, the pull or tie rod connection, and is easily applied to any type of new or existing freight cars — including hopper cars.



On cars equipped with the Franklin Automatic Brake Slack Adjuster, it is not necessary to disconnect the brake rigging to replace worn brake shoes. Also, a simple and convenient reset arrangement, operated from outside the rails, restores the desired piston travel before the car is returned to service.

Bulletin B-1201 gives full information.

FRANKLIN BALMAR CORPORATION

FRANKLIN BALMAR CORPORATION
WOODBERRY, BALTIMORE 11, MD.

Chicago Office:
5001 North Wolcott Ave., Chicago 40

NEW DEVICES

(*Continued from page 88*)

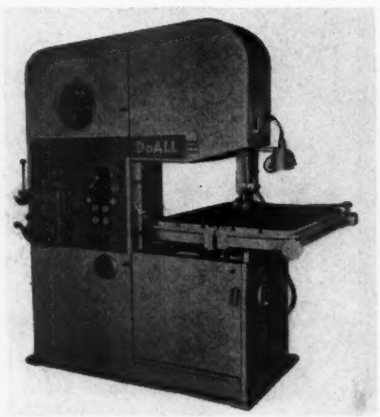
lightweight material, forms the handle.

The 100-watt, rough-service lamp, is seated firmly against a metal flange by a heat and impact-resistant globe guard. Drop tests have demonstrated that the globe cannot loosen, even under severe shock.

Both lamp chamber and handle are explosion-proof, separated by the lamp receptacle. The use of pressure type wire conectors in the cord connector assembly instead of soldered connectors, minimizes the danger of wires being pulled free under the strain of continuous wear. Pressure type wiring also makes cord replacement easier because the cord connector entrance is more accessible..

Rubber bushings are supplied with the fixture to accommodate ⅜-in. to ⅝-in. portable cord. They serve both as a mechanical cable clamp and a watertight seal.

■



Band Machine for Production Sawing

A new line of band cutting machines has been developed for production sawing applications. According to the builder the devices can be utilized for slotting, slitting, serrating, shaping, notching, etc.

Named the Power Cut-Off Machine and introduced by The DoAll Company, 254 N. Laurel avenue, Des Plaines, Ill., these units feature a centralized control panel, hydraulic controls including automatic feed pressure control and coolant system. Sufficient power is incorporated to handle DoAll's high speed steel saw band. The hydraulic table feed is independently variable as to rate of feed and feed pressure and adjustment of stroke.

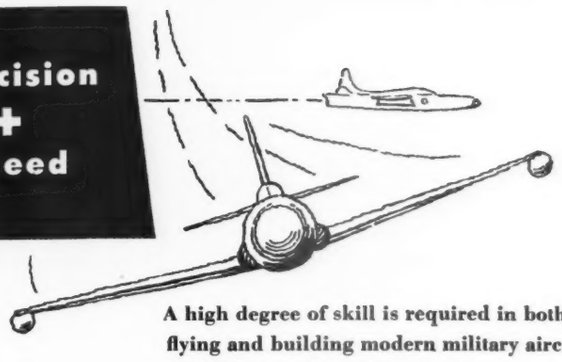
■

Gas-Shielded Welder

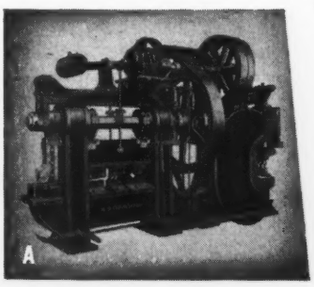
New welding equipment for the consumable-electrode gas-shielded welding process has been announced by the General Electric Company's Welding Department, Schenectady, N. Y. Called Fillerarc, the apparatus includes a welding generator

(*Continued on page 104*)

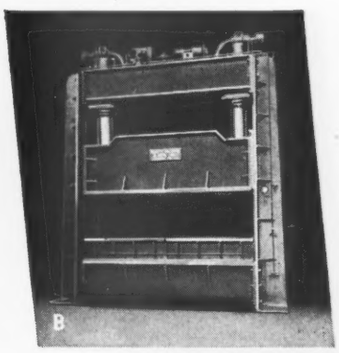
precision + speed



A high degree of skill is required in both flying and building modern military aircraft. BEATTY machines, like the latest of the supersonic jet jobs, are precision-built to afford maximum accuracy and speed in metal frabicating operations. Let a BEATTY engineer analyse your industrial machine needs—if one of the machines shown doesn't answer your production problem, we'll design and build one to your exact requirements.



A. BEATTY Co-Pun-Shear, one unit that does coping, punching and shearing without changing tools.

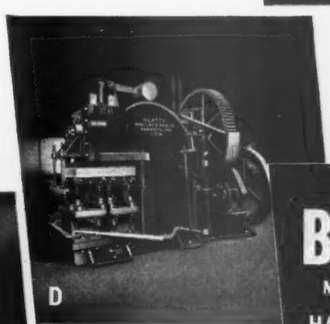


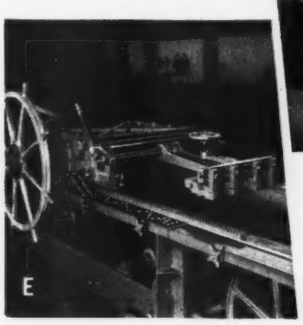
B. BEATTY Vertical Hydraulic Bulldozer for hot and cold pressing and forming of heavy metal.

C. BEATTY Press Brake and Flanger handles any type of bending, forming, flanging, pressing.

D. BEATTY Heavy Duty Punch that handles steel up to 65 ft. long. Punches webs, and flanges.

E. BEATTY Spacing Table handles beams, channels and plates with speed and precision.





BEATTY
MACHINE & MFG. CO.
HAMMOND, INDIANA

The welding equipment consists of three main components: (left to right) the wire drive unit, the welding gun, and a special self-regulating welder.

specifically designed for this process.

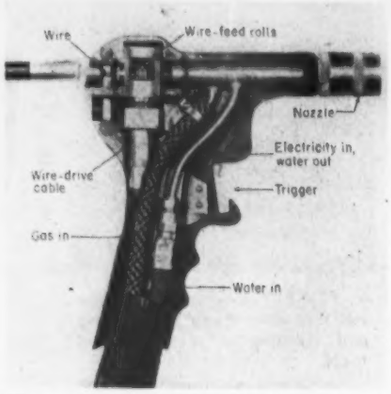
Electrode wire of aluminum, stainless steel, mild steel, copper, magnesium, and other alloys may be employed with argon or helium shielding gas. The process can be used in down-hand, vertical, or overhead positions to weld aluminum of any alloy in thicknesses from 1/32 to 3 in. and stainless steel from 1/16 to 1 in. It is also suitable for welding aluminum bronze, nickel, and magnesium.

The generator is rated at 450 amp. continuously and has a rising volt-amp. characteristic. As current is produced by the welder, the voltage generated increases, making the process self-regulating.

Designed to give constant arc length, the new welder produces any current required up to its full rating. Thus, it is prepared for any wire feeding speed and will supply the current necessary to melt off the wire at exactly the rate it is fed. Machine settings are for arc length only and no current calibrations appear on the dial.

Once arc length is set, the operator can change wire feed, (the only other variable to be controlled) even while welding, without readjusting the welder.

The Fillerarc welder's open-circuit voltage, between 10 and 30 volts will not sustain long arcs, reducing the possibility of burn-back.



The welding gun contains knurled feed rolls for pulling the wire from the wire drive unit, preventing kinking of the small diameter electrode wire.

The Fillerarc gun contains knurled feed rolls for pulling the electrode wire from a spool mounted in the wire drive unit, a trigger to control wire feed and gas flow, and an electrical contact tip. It is water cooled with a rating of 400 amp. continuous d.c.

The third component of the equipment is the wire drive unit. Mounted on a portable carriage, the unit contains a Thymo-trol wire feed drive motor control which powers the knurled feed rolls in the welding gun through a flexible shaft. It incorporates a voltmeter for indicating wire feed speed in inches per minute as well as arc voltage, a gas solenoid valve, control relays, and a spindle for the electrode wire.

■

Mechanical Comparator

A lightweight mechanical comparator, developed for checking operations, has been introduced by The DoAll Company, Des Plaines, Ill. Its gaging head utilizes a double reed system, an amplifying principle that obviates the use of gear trains, levers, racks and pinions. It is designated the Producto-Chek.

Coil springs damp the reeds of the movement to provide vibrationless indications without overswings. Absence of electrical components eliminates the necessity for warm-up time to achieve gaging stability. The column of the unit can be rotated on the base, permitting it to be used with

(*Continued on page 106*)

Lewis sealtite car bolts

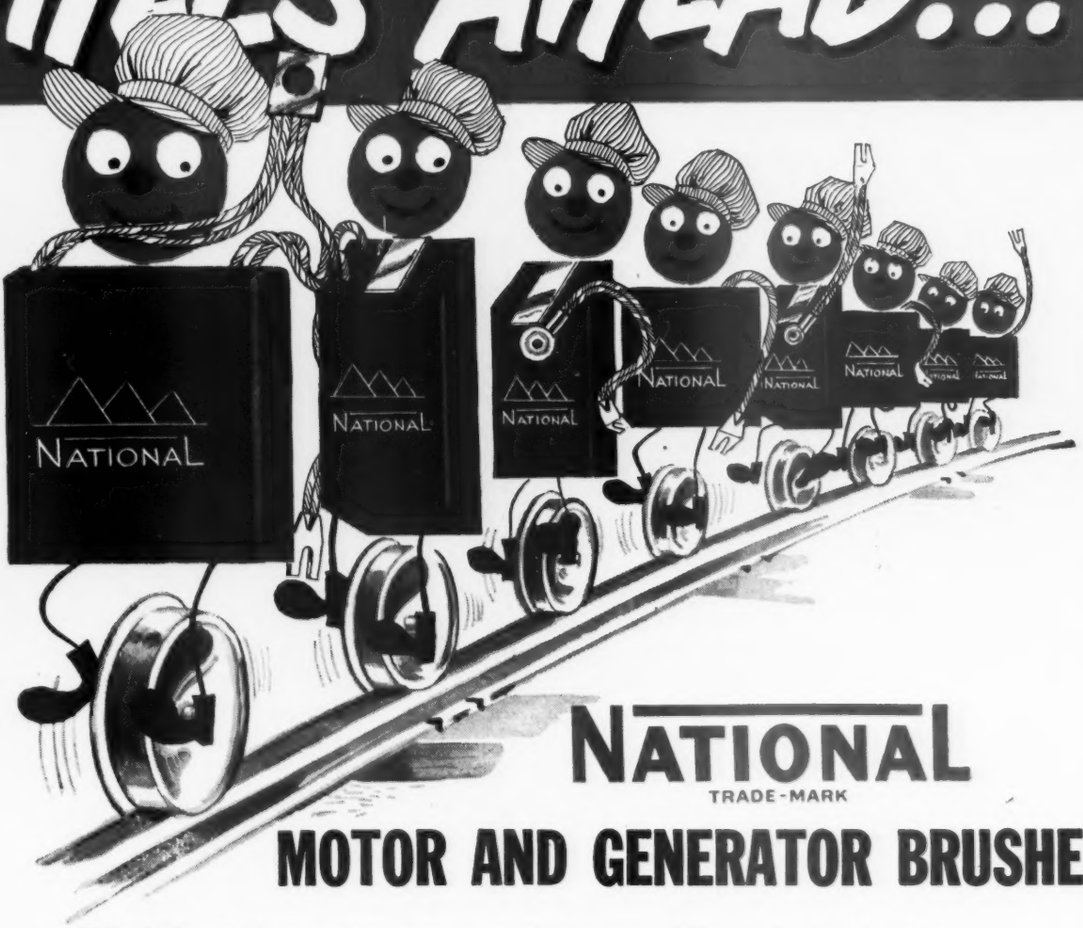
More than 85% of America's Class I railroads use Lewis Sealtite products. Designed to do a better job . . . to last longer . . . to meet the most exacting specifications. Specify Hot Dip Galvanized, Zinc finish for Double-Life and economy.

Lewis BOLT & NUT COMPANY
504 Malcolm Ave. S. E.
MINNEAPOLIS 14, MINNESOTA

LOOK FOR THIS STAMP OF U QUALITY

Sealtite bolts are available with Laktite Nut #2 (shown), or std. sq. and hex.

MILES AHEAD...



NATIONAL
TRADE-MARK

MOTOR AND GENERATOR BRUSHES

• Diesel-electric locomotives have travelled many millions of miles *farther* with "National" traction motor and generator brushes than with all other makes combined!

• For *one* big reason behind this record of sustained leadership look to National Carbon's unparalleled research and development facilities — man-hours and money continually being spent to help save *you* time and dollars in longer life, improved commutator condition, reduced maintenance.

• Whatever your problem in motor or generator brush operation — from main drive to minor auxiliary — you can count on "National" brushes to put you *miles ahead.*

How good is <u>really</u> good brush performance?...Use "National" brushes and SEE!

The term "National", the Three Pyramids device, and the Silver Colored Cable Strand are registered trade-marks of Union Carbide and Carbon Corporation

NATIONAL CARBON COMPANY
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street, New York 17, N. Y.
District Sales Offices: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco
In Canada: National Carbon Limited, Montreal, Toronto, Winnipeg

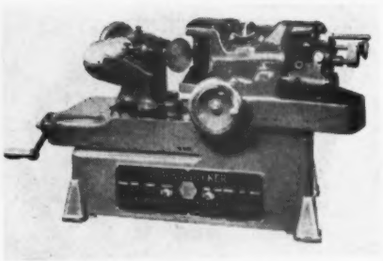
a surface plate or master flat lying adjacent to the instrument.

The device is available in several ranges in both English and metric calibrations. Comparator stands for all ranges are the same.

■

Valve Refacer

Designed to speed valve reconditioning in railroad maintenance shops is a device called the Deluxe Super-Service Valve Refacer. Marketed by The Black & Decker



Mfg. Co., Towson 4, Md., it has a capacity for valve heads up to 4 in.; valve stems up to 11/16 in.; valve angles of 0 to 90 deg.; and traverse grinds at all angles.

Among its features is a complete end grinding attachment for the grinding of valve stems, tappets and rocker arms. A clamp is provided for locking the stem or tappet in place.

Other features of the unit include power from two independent universal motors, hypoid gears, simplified controls, and four point bearing mountings.

■

Paint more cars per day with *A. F. I. Brand* Finishes

Emporia Shop of the Santa Fe provides a fine example of modern paint shop methods.

A group of A.F.I. quick-drying freight car paints are used in the Emporia operation as well as in the shops of other railway lines.

The advantages of A.F.I. products for railway freight car painting are:

1. ***Higher output of cars per day***
2. ***Proper film thickness.***
3. ***Quick drying.***
4. ***Higher gloss, cleaner cars.***
5. ***Excellent durability.***
6. ***Cleaner paint shop.***

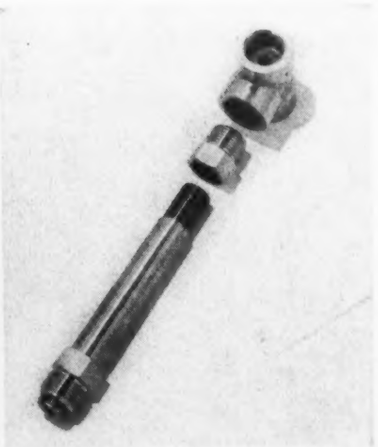
Numerous A.F.I. paint products for diesel locomotives, refrigerator and passenger cars are used by many other leading railroads throughout the country.

AUTOMOTIVE FINISHES, Inc.

Manufacturer of Automotive, Railroad and Industrial Finishes

8747 Brandt Ave.
Dearborn, Mich.

P.O. Box 457, N.W. Station
Detroit 4, Mich.



Differential Dry Joint Assembly

The Differential Dry Joint, a device perfected by the National Welding Equipment Company, 218 Fremont street, San Francisco 5, may be used for joining a nipple to a pipe, a nipple to an elbow, a nipple to a valve housing, etc. It is said to solve the problem of securing a leak-tight joint without the use of silver solder brazing, litharge and glycerine or other sealing compounds, some of which cannot be safely used with flammable gases such as high pressure hydrogen and oxygen or acetylene.

The device makes possible the construction of any desired manifold or other type assembly at the place of use, from tees, elbows, nipples, valves and pigtails. All these fittings may be threaded in the same direction with no other tools than a wrench.

The assembly consists of three fittings: a socket, nipple and bushing.

■

Truck and Trailer Wheel Block

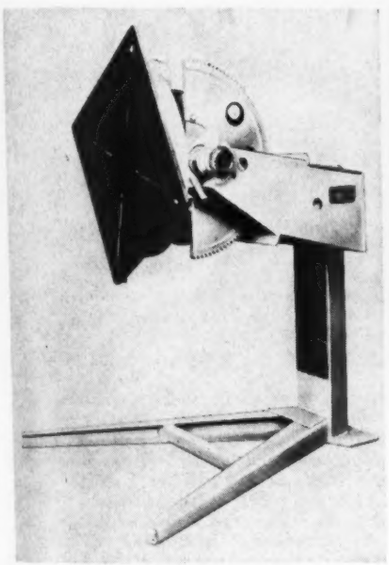
Made of cast steel alloy, this heavy duty truck, trailer and freight car wheel block was introduced by Calumet Steel Castings Corporation, 1636 Summer st., Hammond, Ind.

Called the Casteel Safety Wheel Block, the device is said to assure safe holding under adverse conditions of grade, surface and road bed. They are furnished with cast-in holes to permit nailing to freight

car or truck floors, etc., to insure blocking of heavy equipment during transit.

The block has a wide, curved tread plate which gives greater contact to assure even distribution of load. It features heavy steel gripper teeth on the bottom plate which keeps the block from creeping or slipping. The owner's name may be cast on the bottom plate to identify its owner.

■



Heavy Duty Welding Positioner

Three heavy duty positioners for automatic or manual welding, built in 2500, 3000 and 6000 lb. capacites, have been announced by the Worthington Corporation, Harrison, N. J.

Incorporated into each unit is a differential type variable speed drive to provide stepless speed change from standstill to predetermined top speed. The positioner's table is driven by a spur gear and pinion for minimum backlash.

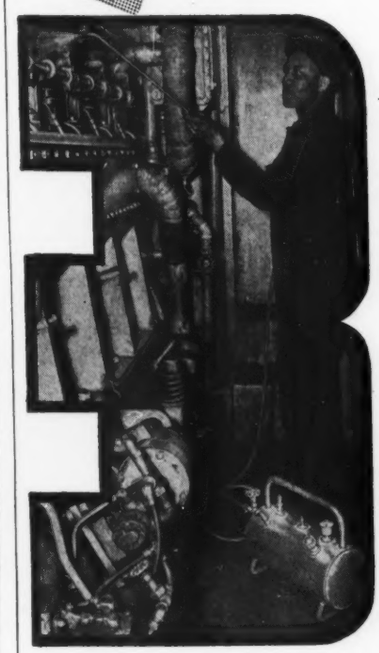
Table tilting is 135 deg. in 40 sec. and table height is adustable in 6 in. steps for handling various sizes of work. A tilt indicator is utilized as standard equipment.

The devices are mounted on fabricated steel posts. They are adaptable for mounting on columns or walls by eliminating the standard posts.

(*Continued on page 110*)

KEEP YOUR DIESEL ENGINE CLEANING

DOWN TO LESS THAN



MAN-HOURS PER UNIT!

Two men, in 1 to 1 ½ hours, will do a better cleaning job on a road unit than with time- and labor-wasting methods. The answer is Diesel Magnusol. Spray on...let soak... rinse off.

Write for details on safe, fast and thorough Diesel Magnusol, including many other uses, such as greasy concrete floors, engine pits, trucks and underbodies.

magnus CLEANERS

Railroad Division

MAGNUS CHEMICAL CO., INC.

77 South Avenue, Garwood, N. J.

In Canada—Magnus Chemicals, Ltd., Montreal

Representatives in All Principal Cities

Every

RIDGID

Is Work-Tested...

Before It Leaves the Factory

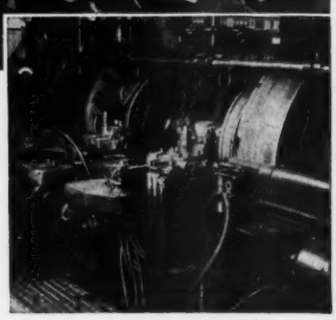
...to make sure it gives you the *Best* and the *Most* wrench service for your money

The reason RIDGID Heavy-Duty Pipe Wrenches are known for the brutal punishment they can take is because of the toughness built into them, checked part by part and then hard work-tested when assembled...not just one wrench in 100 or 1000 but *every last one!*...Add the guaranteed repair-free housing, no-slip no-lock jaws, handy pipe scale, easy spinning adjustment nut and comfort-grip I-beam handle and you see why genuine RIDGID gives you the big value for your money. Buy them at your Supply House.

THE RIDGE TOOL CO. • ELYRIA, OHIO

RIDGID

Work-Saver Pipe Tools



CAN YOU

Machine Wheel Sets in 15 Minutes?

In a modern railroad shop, worn wheel sets are turned —in 15 minutes—on a double end lathe with hydraulic feed and profiling attachment. 40" Diesel, 36" and 33" car sets are machined in the order received—sizes are not grouped.

Actual time to profile tread and flange is 10¾ minutes for 40" Diesel sets—less for the car sets. The profiling, plus time for loading, unloading, and removing roll-over, adds up to 15 minutes—the average floor-to-floor time for the three sizes. Here's how it's done:

Three Kennametal clamped-insert tools are used in each turret. Tool #1 removes rollover; #2 tops the flange while insert A of tool #3 profiles from outside radius across tread and up to top of flange. Insert B of #3 then machines inner side of flange to complete the operation.

If you are interested in seeing every step of this application of modern carbide tooling . . .

See THE COLOR MOVIE SHOWING COMPLETE OPERATION

A new sound-color motion picture, "Modern Railroads," shows each phase of the operation, from the time the pair of wheels is dropped until completely machined. See your Kennametal representative to arrange for showing. Kennametal Inc., Latrobe, Pa.

A-1

KENNAMETAL*

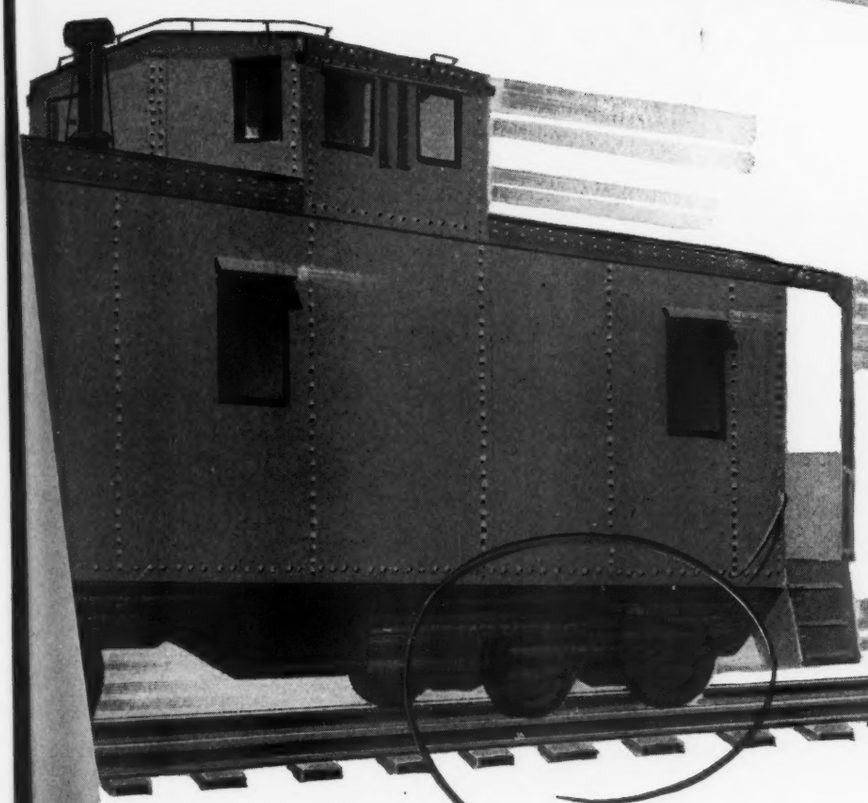
CEMENTED CARBIDE TOOLING THAT INCREASES PRODUCTIVITY

*Registered Trade-Marks

SALES OFFICES IN PRINCIPAL CITIES

MODERN HIGH-SPEED, EASY RIDING

CABOOSE CAR TRUCKS



BARBER-BETTENDORF

Swing Motion

CABOOSE CAR TRUCKS

●

ANOTHER OF THE
FINE TRUCKS CAST BY

SCULLIN

STEEL CASTINGS MANUFACTURER

NEW YORK
CHICAGO
BALTIMORE
RICHMOND, VA

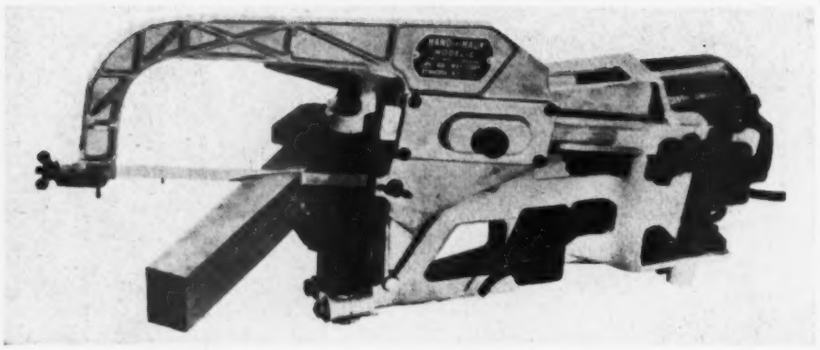
SCULLIN STEEL CO.

SAINT LOUIS 10, MISSOURI

NEW DEVICES

(*Continued from page 107*)

Portable Power Hack Saw



Called the Hand-I-Hack, this 50 lb. saw cuts metal, plastic or fibre stock of 3 in. or less diameter at any angle from 45 to 90 deg. It is manufactured by Lipe-Rollway Corporation, Syracuse 1, N. Y.

Its saw blade draw cuts and lifts on its return stroke, eliminating the necessity for weights. This enables the saw to be operated vertically, horizontally and upside down. Sawing pressure is regulated entirely by a knurled screw.

The saw's operation is fully automatic, shutting itself off after completing a cut. Speed of blade is 115 strokes per min. without load. The device is powered by a 1/3 hp. electric motor.

■

THE ACTUAL IS LIMITED: THE POSSIBLE IS IMMENSE
NEW LINCOLN PLANT CREATED BY INCENTIVE-INSPIRED CO-ACTION IN DEVELOPING POSSIBILITIES IN PRODUCT
© LE Co. 1953

Fig. 1. Rugged, one-piece construction *results from welding end sheets, end windows and side windows. Diaphragms are arc welded to center sill and end sheets with Lincoln "Fleetweld 5" electrodes.*

Fig. 2. All welded lockers *with permanent, trouble-free design are all welded from ⅛" sheet using Lincoln "Shield-Arc" DC welders with Dual Continuous Control.*

Builds stronger, more rugged cars with ARC WELDING

EFFICIENT construction of cabooses is accomplished through fast, low-cost arc welding at this Class I car shop. Many assemblies are all welded, providing durable construction that eliminates possibilities of rusting and reduces future maintenance expense.

To speed shop operation, Lincoln "Shield-Arc" welders with Dual Continuous Control provide the *right type* of arc as well as *right arc intensity* through simple dials. Thus, fast, easy welding in all positions . . . flat, vertical or overhead . . . is achieved to save shop time and cut fabricating costs.

Dual Continuous Control is a feature developed by Lincoln and is found on "Shield-Arc" DC welders.

Fig. 3. Fabricate Body Bolster *center filler using ½" steel plate.*

GET THE FACTS—Bulletin 459 giving cost-cutting details on Lincoln "Shield-Arc" welders is available by writing the Lincoln Electric Railway Sales Co., 11 Public Square, Cleveland 13, Ohio. Railroad representatives of

THE LINCOLN ELECTRIC COMPANY
CLEVELAND 17, OHIO
THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT

Safety Valve

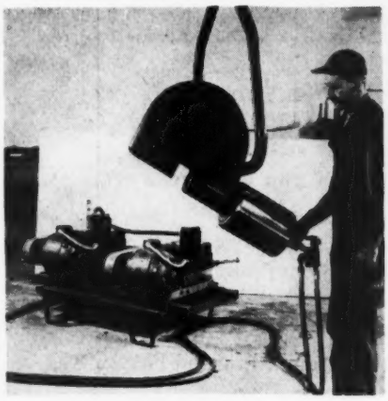
To control and prevent explosions caused by pressure expansion in 50 gal. metal drums containing all flammable liquids except carbon disulphite and diethyl ether, the Vent-A-Drum safety valve has been perfected by the Central Safety Equipment Company, Philadelphia 25. The device has been approved by Factory Mutual Laboratories.

Screwed into the bung opening of a standard 50 gal. drum, the valve functions through a series of six automatic actions. It permits entry of air into drum when liquid contracts or is being withdrawn; it allows air to escape slowly when small rises in temperature causes liquid to expand; it relieves excess pressure quickly when unusual heat causes liquid to build up pressure; it automatically resets and

shuts off flow of vapor when pressure is relieved; it prevents entry of fire into the drum; and it seals off all flow of vapor and liquid should the drum turn over.

The unit has 23 functioning parts, weighs less than 2 lb. and measures about 3½ in. high.

■

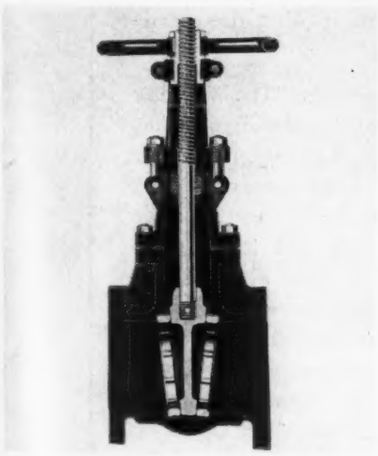


Suspension Type Mobile Guillotine

Combining high thrust with relative mobility, this device is rated so as to cut 2¾ in. dia. steel rod in 13 sec. The device, known as the Model 25-EE and made by the Manco Mfg. Company, Bradley, Ill., is also adaptable for riveting cold rivets up to 1 in. and for punching and pressing.

Its hand lever control is manually operated, eliminating solenoids. The unit provides a 360 deg. swivel and the cutting head weighs 470 lb. Two electric hydraulic pumps mounted in tandem provide 150 tons thrust.

■



Gate Valve

This cast iron gate valve, containing 3 per cent nickel for corrosion resistance, has been designed for mildly corrosive service in process industries by The Lunkenheimer Company, Box 360, Cincinnati 14, Ohio. Its trim, where corrosion does

(*Continued on page 114*)

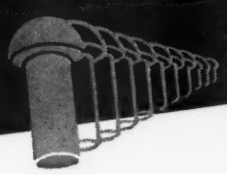
BETTER, FASTER, CHEAPER TESTING
for insulation and winding faults

Westinghouse Surge Comparison Tester reduces production test time, permits positive results, fewer rejects—bringing substantial savings. This electronic device is designed to detect and locate insulation faults and winding dissymmetries in motors, generators, some types of transformers and coils. It operates quickly, simply, with fingertip control. Highly mobile and portable, it fits easily into production line techniques as well as repair shop. For more complete information, write Westinghouse Electric Corporation, I. E. Devices Section, 2519 Wilkens Avenue, Baltimore 3, Maryland.

YOU CAN BE SURE...IF IT'S Westinghouse

3-02257

PROPERLY HEATED RIVETS at a SAVING!



with a **JOHNSTON RIVET FORGE!**

AVAILABLE WITH SEMI-PNEUMATIC TIRES.

The Johnston Rivet Forge is outstanding for its ability to hold adjustment and operate steadily without attention. It's available either with steel wheels or equipped with semi-pneumatic tires that absorb vibration and roll along smoothly.

Write for Bulletin R-801!

Over Thirty Years Experience in Design and Manufacture of Burners • Blowers • Furnaces • Rivet Forges • Fire Lighters • Tire Heaters • And Allied Equipment

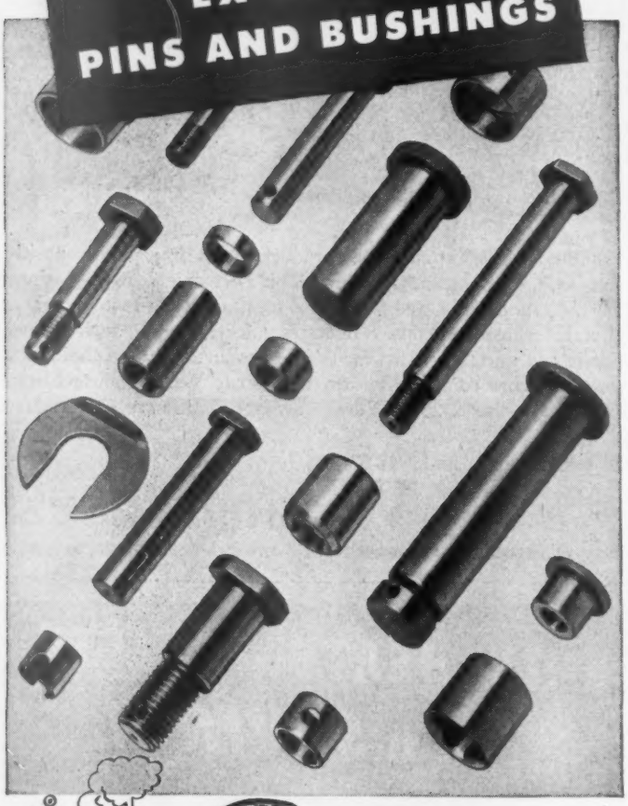
THE JOHNSTON LINE — SAFETY — DEPENDABILITY

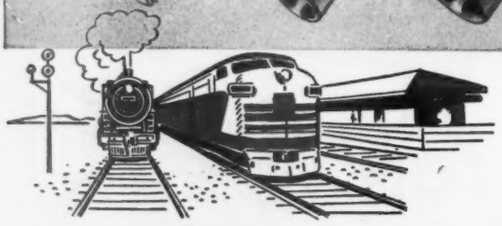
JOHNSTON MANUFACTURING CO.
2825 EAST HENNEPIN AVE.
MINNEAPOLIS 13, MINN.

ENGINEERS & MANUFACTURERS OF INDUSTRIAL HEATING EQUIPMENT

HARDENED and GROUND for LONGER wear

EX-CELL-O PINS AND BUSHINGS





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52-29

Standard styles and sizes of Ex-Cell-O pins and bushings for steam, Diesel, and passenger car equipment are given in the new Ex-Cell-O Bulletin 32428. Write today for your copy.

RAILROAD DIVISION

EX-CELL-O CORPORATION

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But why MEN over 45?

Our doctors still don't know *why*, but if you are a man over 45 you are six times as likely to develop lung cancer as a man of your age twenty years ago. They *do* know, however, that their chances of saving your life could be about *ten times* greater if they could only detect cancer long before you yourself notice any symptom. (Only 1 in every 20 lung cancers is being cured today, largely because most cases progress too far before detected.)

That's why we urge that you make a habit of having your chest X-rayed every six months, no matter how well you may *feel*. The alarming increase of lung cancer in men over 45 more than justifies such precautions. Far too many men die *needlessly!*

Our new film "The Warning Shadow" will tell you what every man should know about lung cancer. To find where and when you can see this film, and to get life-saving facts about other forms of cancer, phone the American Cancer Society office nearest you or simply write to "Cancer"—in care of your local Post Office.

American Cancer Society

what good is

half a wheel?

good enough to show in cross section why whole AMCCW chilled car wheels can do a superior job for railroads.

The soft gray iron hub metal is easily machinable, insuring lowest cost for labor and boring tool maintenance; and easier, less critical mounting on axles.

The extreme hardness and accurate control of the white tread metal (chilled iron) gives maximum service with minimum loss of metal, and assures retention of rotundity throughout the long life of the wheel.

Derailment records show that the probability of chilled wheels coming loose on axles is less than that of wheels of any other metal.

The new design, either cored or solid hub, has a better distribution of metal from hub to flange to withstand the stresses developed under today's operating conditions.

For these and other reasons, chilled car wheels have a safety record unequalled in freight car service. For details, write for booklet, "The Chilled Car Wheel."

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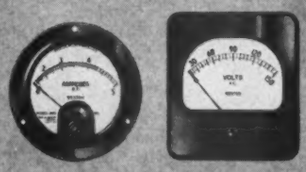

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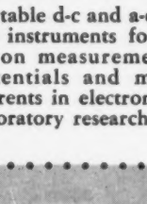

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One of a line of pocket-size meters, Model 697 combines a selection of a-c and d-c current, and resistance ranges. Ideal for maintenance testing and many inspection requirements.

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A multi-range, multi-purpose, ultra-sensitive analyzer, for laboratory and industrial checking of electrical and electronic circuits. Has 28 practical scale ranges; measures d-c and a-c voltage, d-c and a-c current, and resistance. Accessories available to extend ranges. Compact and portable; furnished in either oak or steel case.

Model 901
Portable Test Instruments

Available in d-c, Model 901 and a-c, Model 904, single and multiple ranges of wide coverage. Excellent scale readability and shielding. Accuracy within ½ of 1%.

NEW DEVICES

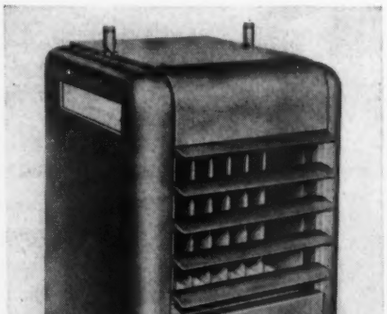
(*Continued from page 111*)

the greatest damage, is offered in either stainless steel or all-monel.

According to the manufacturer, the device can find application in the oil industry, chemical processing industries, and other jobs in railroad yards involving the transfer of liquids.

The device features precision machined disc-guides. These guides hold the disc in alignment as the valve is closed, preventing pressure from forcing the disc against the opposite seat to cause chatter and excessive wear.

■



Gas-Fired Unit Heaters

These heaters, made in seven sizes, are suitable for use on all types of natural, manufactured and liquefied petroleum gases. Heat output ranges from 20,000 to 160,000 Btu per hr. with fan diameters from 12 to 20 in.

Manufactured by the American Air Filter Company, Inc., Louisville 8, Ky., the units are finished with a grey-green enamel and are suitable for installation where appearance is a prime factor and where central heating system may not be available.

■

Electric Impact Tool

Designated the No. 2U Impactool, this unit was designed to save time on nut running, tapping, screw driving, reaming, drilling, etc. applications. It is rated for nut running up to ¼ in. bolt size.

Manufactured by the Ingersoll-Rand Company, 11 Broadway, New York 4, the device should find wide use for general engine repair and installation work. It weighs 5 lb. measures 9⅜ in. overall, and will operate from any 110 volt source, a.c. or d.c.

The tool is offered as a bare piece or in various service kits. Larger sizes are available for work with ⅜, ⅝ and 1¼ in. bolt sizes.

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NEWS

Eisenhower Revokes 1952 Retirement Order

President Eisenhower has revoked an executive order issued by President Roosevelt in 1942 to exempt from the compulsory-retirement-at-70 rule all Presidential appointees who were then serving indefinite terms. The revocation becomes effective March 31. Allyn C. Breed, assistant director and former acting director of the Bureau of Locomotive Inspection, is one of the few government employees still continuing in service pursuant to the 1942 order.

A.A.R. Meetings Cancelled

The 1954 annual meetings of divisions and sections under jurisdiction of the Operating and Maintenance Department of the Association of American Railroads have been cancelled.

The cancellation actions were pursuant to a directive issued by A.A.R. Vice-President R. G. May. Mr. May's notice to division and section officers indicated that the matter might be reopened later if the economic outlook then seems to warrant reconsideration.

Among the meetings canceled were those scheduled for this year by the Mechanical Division and Electrical Section. The order does not affect the Engineering Division.

Not yet determined is the fate of meetings scheduled for next September by the Coordinated Mechanical Associations, which include the Air Brake Association; Car Department Officers' Association; Locomotive Maintenance Officers' Association; Master Boiler Makers' Association; and Railway Fuel and Traveling Engineers' Association.

Mechanical Division Reports To Be Acted On

A circular letter issued by the Mechanical Division states that, in the absence of the annual meeting, committees of the division will prepare annual reports in the usual manner for consideration at a meeting of the General Committee, probably on June 29 and, if necessary, on June 30. The General Committee will review all of the reports and decide which recommendations shall be submitted to letter ballot vote of the members, also what other items of interest shall be passed on as information.

As in 1938 when no annual meeting of the Mechanical Division was held, a combined report of the General Committee and a letter ballot circular will be printed and distributed as soon as practicable after the General Committee meeting in June. This procedure is in accordance with Sec. 4 (b) of the Rules Of Order of the Mechanical Division which provides that "The General Committee shall exercise such supervision over the standards, recommended practice, or rules of this Division as may be necessary to meet any emergency that may arise during the year in the conduct of the affairs of the Division."

With no annual meeting of the Mechanical Division in 1954, there will be no published proceedings, but committee reports in abbreviated form and other related data handled during this year will be included in the next subsequent proceedings.

Appliance Rules Have Own Adapter

A device of the "not-otherwise-indexed-by-name" type, which is so useful to tariff makers, has also fitted the Interstate Commerce Commission's safety appliance rules with built-in adaptability to new rolling-stock.

This was pointed up in an address which the director of the commission's Bureau of Safety, S. N. Mills, made recently before the Southern and Southwestern Railway Club at Atlanta.

The Adapter—The commission's March 13, 1911, order, prescribing the appliance rules, included a still-effective provision of the "N.O.I.B.N." type which reads as follows: "Cars of construction not covered specifically in the foregoing sections . . . shall have, as nearly as possible, the same complement of handholds, sill-steps, ladders, hand-brakes and running-boards as are required for cars of the nearest approximate type."

"In recent years," Director Mills said, "this paragraph has proved to be one of the most important provisions of the order. It has made possible, without delay and the formality of numerous proceedings before

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE FEBRUARY ISSUE

Diesel-Electric Locomotive Orders

Road	No. of units	Horse-power	Service	Builder
Chicago & North Western	15	.....	General purpose	Electro-Motive
	2	600	Switchers	Electro-Motive
	10	1,600	Switchers	Fairbanks, Morse
	7	1,600	Road switchers	American Locomotive
	3	1,200	Switchers	Baldwin-Lima-Hamilton
Illinois Central	48	1,750	General purpose	Electro-Motive
	2	2,400	Passenger	Electro-Motive
New York, Chicago & St. Louis	23	1,600[1]	Road switchers	American Locomotive
	2	1,600[1]	All-service switchers	Baldwin-Lima-Hamilton

Freight-Car Orders

Road	No. of cars	Type of car	Builder
Canadian National:			
Grand Trunk Western	100	50-ton refrigerator	Pacific Car & Fdry.
Central Vermont	1	50-ton air-drump	Magor Car
Atlanta & St. Andrews Bay	26[2]	50-ton pulpwood	Company shops
Chicago & North Western	25[3]	Caboose	International Railway Car
Chicago, Rock Island & Pacific	100[4]	50-ton box	Pullman-Standard
	100[4]	70-ton covered hopper	Pullman-Standard
Denver & Rio Grande Western	10[5]	Cabooses	Company shops
Great Northern	15[6]	50-ton box	Pullman-Standard
Lehigh Valley	100	70-ton covered hopper	Company shops
	1	125-ton depressed center flat	Company shops
Missouri Illinois	100[7]	70-ton covered hopper	Company shops
New York Central	2,500[8]	Box	Despatch shops
Union Tank Car Co.	850	50-ton tank	Company shops

Passenger-Car Orders

Road	No. of cars	Type of car	Builder
Great Northern	20[9]	Dome	Budd

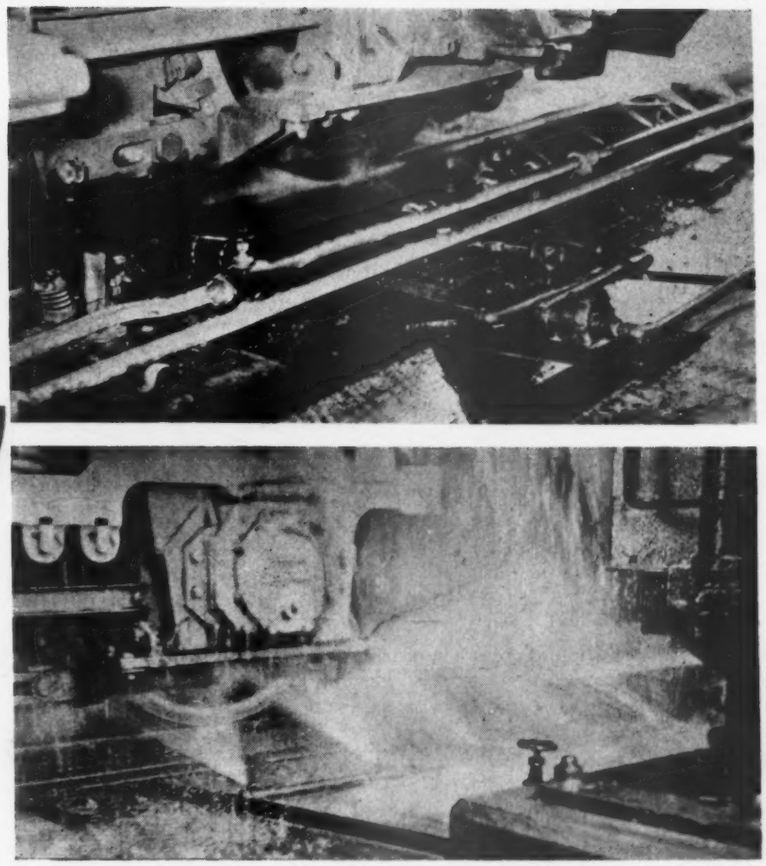
[1] Estimated cost of the 25 units, $3,737,171.
[2] Cost, $252,000. Deliveries to be completed by May 1.
[3] For delivery this year.
[4] Box cars delivered in February. Hopper cars to be delivered in April or May.
[5] Cost, $125,000.
[6] Delivered in February. Cars have suchion underframes.
[7] To be built during third quarter of 1954.
[8] 2,000 to be wood lined; 500 to have perforated steel linings. Delivery to be completed early next year.
[9] Delivery of this $5.500,000 order scheduled for the beginning of the vacation travel season in June 1955. Four cars will be placed in each of the five "Empire Builder" train sets which provide daily service between Chicago and Seattle and Portland. Nine of the cars in each set will be dome coaches, seating 44 passengers on the lower level and 24 in the dome compartment. The fourth will be for sleeping-car passengers, with a full-length upper level accommodating 77 passengers in chair and lounge seats. An additional lounging section seating 34 passengers will be located on the lower level. Two additional cars are extras.

Notes:

Central of New Jersey.—The Jersey Central in connection with its plans to operate improved and entirely new passenger service for all communities between New York City and Hampton, N. J. with coordinated service to Newark, N. J., expects to invest over $2,250,000 in new rolling stock and facilities. If the proposed new schedules are authorized by the Public Utilities Commission of New Jersey, E. T. Moore, president of the J. C., has said that "the remaining steam locomotives still in passenger service would have to be replaced with diesels and that seven new diesels of much greater horsepower than any the road now owns would have to be bought."

SAVE MONEY

Clean diesel wheels and trucks with automatic Oakite "track-trip" spray-washing



Oakite automatic "track-trip" wheel cleaning set-up saves money. It prevents solution and rinse water waste. Top picture, cleaning. Bottom picture, rinsing.

YOU ARE LOOKING at a set-up for cleaning and rinsing diesel wheels and trucks. It was designed by Oakite for a big Western Railroad. These pictures were taken at that yard.

THIS ROAD wanted to eliminate costly, time-consuming manual cleaning. They were looking for some simple, inexpensive mechanical method . . . one they could build themselves in their own yard.

HERE'S HOW IT WORKS. Pressure, transferred from wheel flange to track tripper, depresses valves for spray cleaning. Solution spray responds only to wheel pressure. Spraying stops as wheel pressure diminishes.

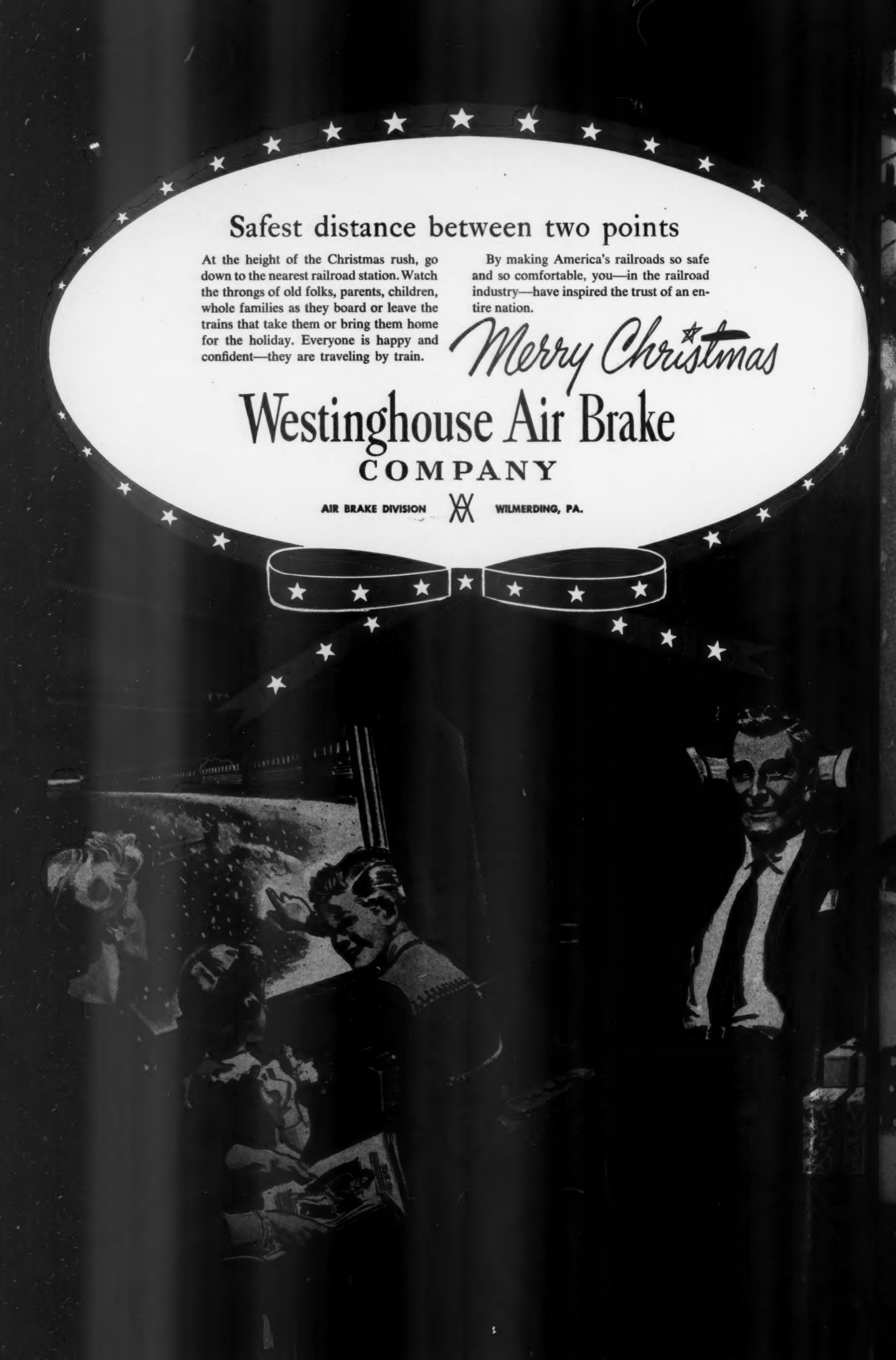
RESULTS. Considerable savings in solution upkeep and less waste of rinsing water since spraying occurs only as wheels enter spraying area. No time wasted for manual valve adjustments. No hand scrubbing.

If you'd like more information on washing diesel wheels and trucks just drop us a line. We'll be glad to send you complete details, drawings.

Oakite Products Inc., 46 Rector Street, New York 6, New York

OAKITE

RAILWAY DIVISION


Safest distance between two points
At the height of the Christmas rush, go down to the nearest railroad station. Watch the throngs of old folks, parents, children, whole families as they board or leave the trains that take them or bring them home for the holiday. Everyone is happy and confident—they are traveling by train.
By making America's railroads so safe and so comfortable, you—in the railroad industry—have inspired the trust of an entire nation.
Merry Christmas
Westinghouse Air Brake
COMPANY
AIR BRAKE DIVISION
WILMERDING, PA.

Standard

RAILWAY EQUIPMENT MANUFACTURING COMPANY

CHICAGO 4: 310 SOUTH MICHIGAN AVENUE

NEW YORK 17: 247 PARK AVENUE

wishes you a

VERY MERRY CHRISTMAS

and a

HAPPY NEW YEAR

It's truly Amazing!

DAYTON'S NEW

For greater convenience and economy, the new Dayton 1" V-Belt is available in 250 foot reels. It can be easily handled and quickly cut to any desired length without waste.

1" D-R V-BELT* for Car Lighting Drives

35% TO 72% MORE MILES OF UNINTERRUPTED SERVICE REPORTED BY MAJOR RAILROADS

Here's the biggest news in railway V-Belt history. Major railroads who installed this Dayton V-Belt after it was announced to the industry in July 1952, report *35% to 72%* more mileage of *uninterrupted service* during the months that followed. It's Dayton's new, completely re-engineered 1" D-R V-Belt that's breaking all records for performance in the car lighting field.

The internal construction of the new Dayton 1" V-Belt gives it unusual strength, increased flexibility and greater resistance to connector pullouts. Through the addition of new, higher quality materials, added resistance to heat and cold have been effected. Yet, you pay no more for this finer, stronger, greatly improved Dayton 1" V-Belt than it would cost for ordinary belts offering far less effective service life.

If yours is one of the few railroads not experiencing the benefits offered by this better belt, then it will pay you to investigate. Prove to yourself as others have how the Dayton 1" V-Belt can give your road more miles of dependable, uninterrupted car lighting service while reducing maintenance, belt costs and car lighting failures. Contact your nearest Dayton Field Sales Engineer for all the facts, or write, wire or call: Dayton Rubber Co., Railway Division, Dept. 20, Dayton 1, Ohio.

by Dayton Rubber

Since 1905

WORLD'S LARGEST MANUFACTURER OF V-BELTS

DAYTON RUBBER CO., RAILWAY DIVISION • DAYTON 1, OHIO

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UNITED STATES STEEL
USS
HIGH STRENGTH STEELS
TWENTY YEARS OF PERFORMANCE

170,000 freight cars have been built

TYPICAL CONSTRUCTION AND HEAVY REPAIR COST FOR 70-TON HOPPER CARS USING COR-TEN STEEL AND COPPER BEARING STEEL IN AAR STANDARD THICKNESSES

CONSTRUCTION COST	COST OF HEAVY REPAIRS		SERVICE LIFE OF CAR WITH HEAVY REPAIRS	CONSTRUCTION AND HEAVY REPAIR COSTS	AVERAGE COST PER YEAR
	After 15 Years	After 20 Years			
Copper Bearing Steel $5,500.00	$2,220.00		30 Years	$7,720.00	$ 257.33
COR-TEN steel $5,805.00		$2,525.00	40 Years	$8,330.00	$ 208.25

Total Cost Per Car of Copper Bearing Steel.....$7,720.00

Savings by use of COR-TEN steel (10 Years' additional service).. 2,573.00

Additional Cost of COR-TEN steel..... 610.00

Net Saving Per Car over 40-Year Period.....$1,963.00

better with U·S·S COR-TEN steel since 1933

NORFOLK AND WESTERN

has standardized on High Strength Steel construction for open-top cars both new and rebuilt

THE extensive freight car program that the Norfolk and Western Railway Company now has under way includes the construction of 300 70-ton hopper cars, 1000 70-ton gondola cars and heavy repairs to 645 50-ton hopper cars. All of this equipment will be built with corrosion-resisting U·S·S COR-TEN steel body plates.

What is more, these cars will be built with U·S·S COR-TEN steel used in the *same* thicknesses as normally used for carbon steel body sheets. And for a very important reason—to SAVE MONEY!

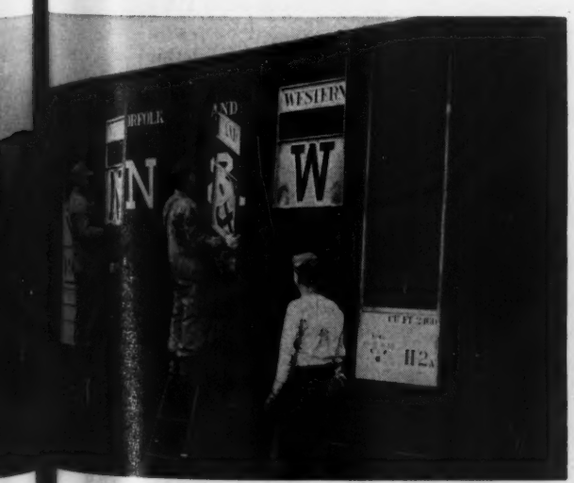
With U·S·S COR-TEN steel used in standard thicknesses, Norfolk and Western expects to extend the life between heavy repairs by at least 33%.

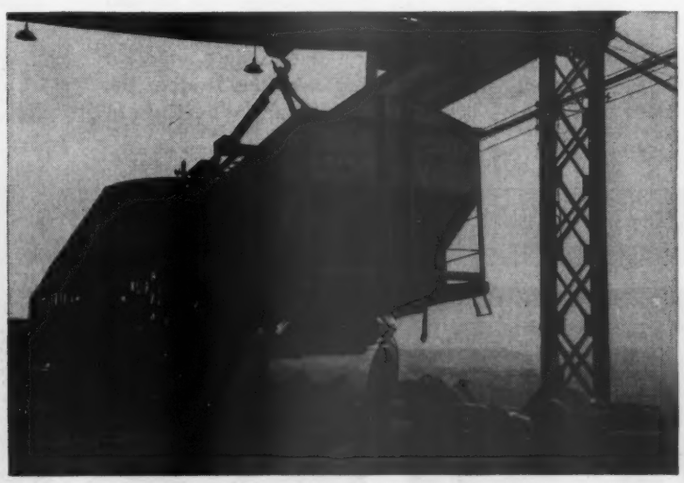
The long-time service tests made on hopper cars built half of U·S·S COR-TEN steel and half of copper steel, clearly indicate a substantially *longer* life expectancy for U·S·S COR-TEN steel body sheets. Comparisons of service life on various railroads fully verify these findings.

During their expected service life, these COR-TEN-built Norfolk and Western hopper cars should require only one major repair in forty (40) years while similar cars of copper-bearing steel construction would require one major repair for a thirty (30) year life. Several railroads have estimated results of *clear* savings in maintenance costs between 5 to 6 times the extra cost for COR-TEN steel construction. (See typical cost comparison chart at left.)

Our engineers who pioneered the application of U·S·S COR-TEN steel 20 years ago will be glad to show you how this performance-tested steel can be used to pay equally desirable dividends in your equipment, either new or rebuilt.

* * *





UNITED STATES STEEL CORPORATION, PITTSBURGH • AMERICAN STEEL & WIRE DIVISION, CLEVELAND
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO • NATIONAL TUBE DIVISION, PITTSBURGH • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS • UNITED STATES STEEL EXPORT COMPANY, NEW YORK

3-1403

UNITED STATES STEEL

MAGNUS R-S JOURNAL STOP eliminates biggest

This new development prevents excessive axle displacement under braking and impact forces—eliminates waste grabs, adds life to bearings, keeps packing in place, and cuts down man hours for car servicing.

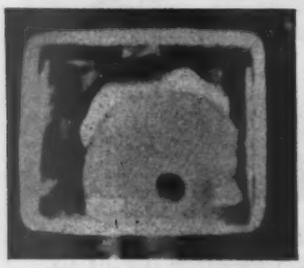
From a purely mechanical standpoint — what's the biggest single cause of hot boxes? The answer is truck design — loose, nominal-dimension construction that permits virtually unrestricted axle movement fore and aft within the journal box. The result: whenever there's a heavy brake application, or a heavy impact during road or switching operations, the axle rolls right out from under the bearing — cocks both bearing and wedge out of position. The packing is displaced, too — often gets trapped under the bearing crown. And linings are spread because of the concentrated uneven loading.

The new Magnus R-S Journal Stops for standard integral cast boxes prevent all that — virtually eliminate waste grabs and spread linings due to concentrated loading. Made of bronze bearing metal, they keep the bearing and wedge in place *under all conditions*, let the bearing take the load in the crown where it should. If you put the bearings in right, they stay right. Journal Stops keep the packing in place, too. Can cut down time-consuming adjustment at servicing points — may speed up departure times.

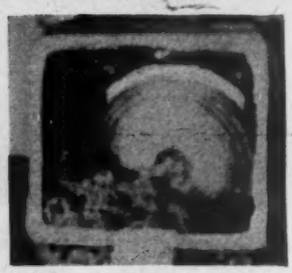
R-S Journal Stops have been in test service for more than a year and a half. During that time there has been only slight wear on the Journal Stops and *there have been no hot boxes!* All bearings removed for inspection after 18 months were returned to service. In addition, it was found that there was substantially less than normal wheel flange wear, and the wear uniform on all wheels. This could mean very important savings in terms of extended wheel life alone.

Be sure to get your free copy of our Bulletin 1002 describing the new Magnus R-S Journal Stop and Packing Retainer. Just write a post card or letter to Magnus Metal Corporation, 111 Broadway, New York 6; or 80 East Jackson Blvd., Chicago 4.

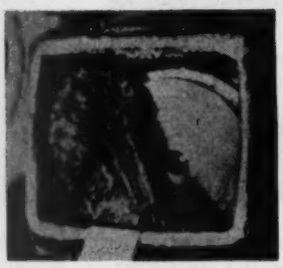
This CAN'T HAPPEN when you use the R-S Journal Stop



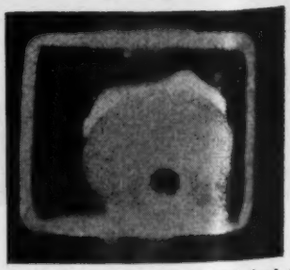
High-speed photo showing axle and bearing displacement at 11.5 mph impact.



Still shot shows packing condition after 450 mile run with no switching or humping involved.



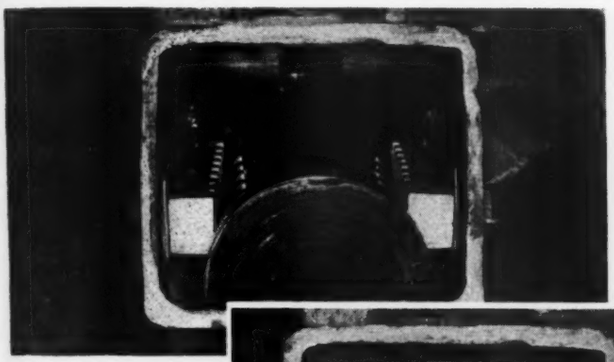
Another example of displaced packing after 450 mile run.

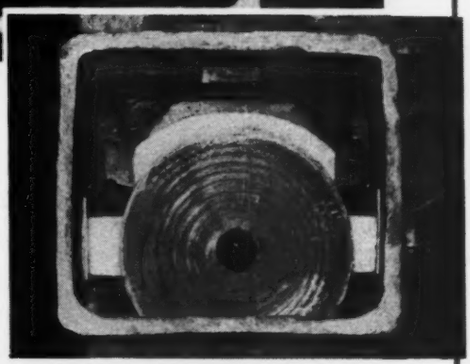


High-speed photo of incipient waste grab at impact of 7.7 mph.

and PACKING RETAINER

single cause of hot boxes!

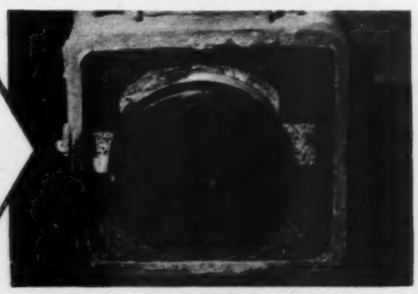




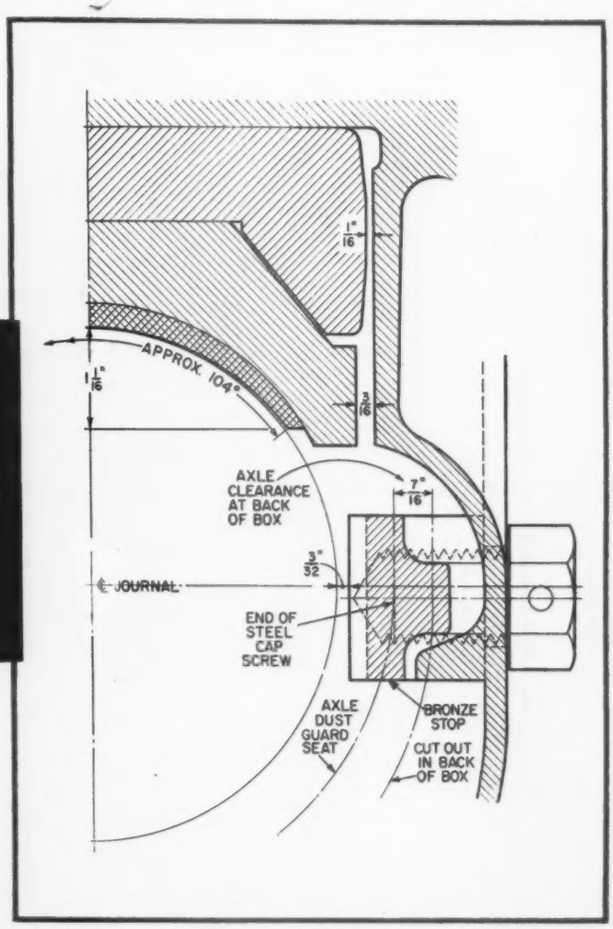
Above: Jacked journal box with packing, bearing and wedge removed, showing mounting of Journal Stops on inside walls of box.

Right: Journal box with wedge and bearing in place (no packing), showing Journal Stops and car journal in operating position.

Here's what happened to the packing in a journal box after flat-switching impact at 11½ mph. Packing badly displaced.



Here's a box on the same car fitted with Journal Stops after undergoing same 11½ mph impact test. Packing is still in its proper position.



Cross-section of Magnus R-S Journal Stop as applied to 5½-in. x 10-in. journals. Regardless of journal size, the bronze journal stop is 2½-in. shorter than journal length. Bearing and wedge can be taken out for inspection without removing Journal Stops. Only one Journal Stop need be removed from each box to remove side frames.

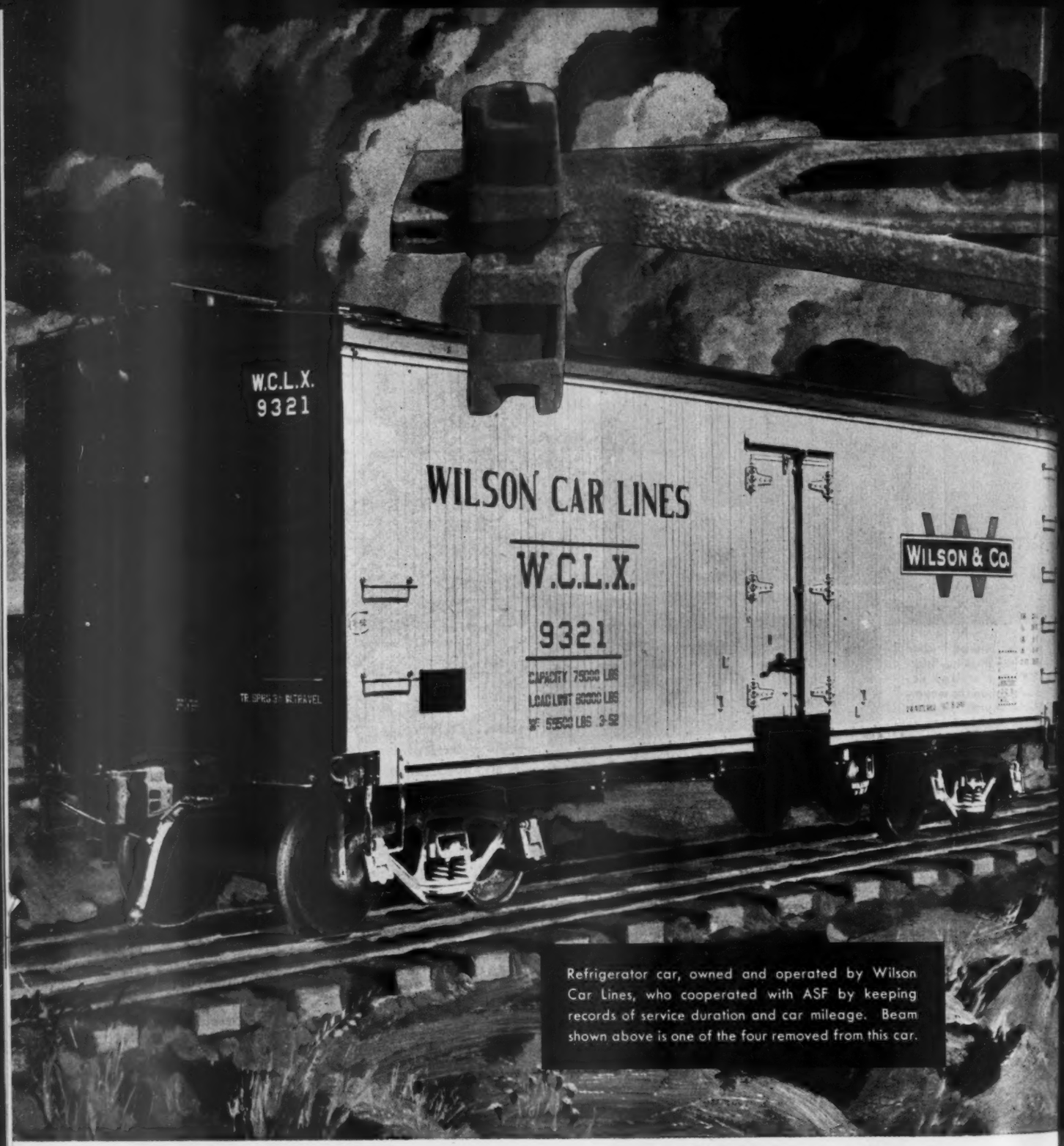
MAGNUS

Solid Bearings

Right for Railroads

...in performance...in cost

MAGNUS METAL CORPORATION *Subsidiary of* **NATIONAL LEAD COMPANY**



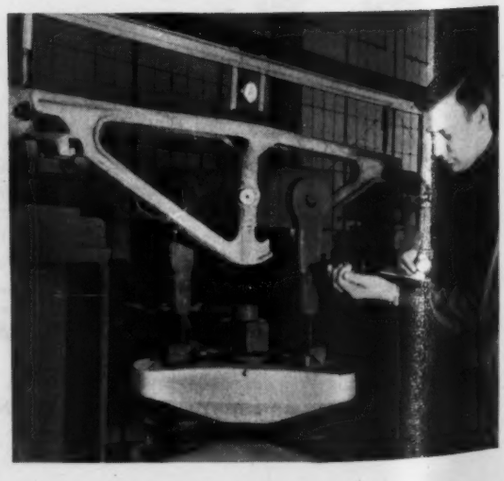
Refrigerator car, owned and operated by Wilson Car Lines, who cooperated with ASF by keeping records of service duration and car mileage. Beam shown above is one of the four removed from this car.

20% above requirements—on the AAR Static Test

Only .056" deflection at 18,000 lbs., compared to permissible .070" deflection. Two of these beams were then loaded to the breaking point—which proved to be almost *four times* their rated capacity!

38% above requirements—on the AAR Fatigue Test

The two remaining beams withstood an average of 1,032,181 loadings—well over a quarter of a million more than required for AAR certification. (Each loading 18,000 lbs., applied at the rate of 50 per minute.)



Unretouched close-up of ASF Unit Beam—after 34 months and 119,503 miles under a Wilson Car Lines Refrigerator Car. Measurements showed that alignment and metal thickness were closely comparable to those of a new cast-steel beam.

You'd think this ASF Cast-Steel Unit Beam was brand new instead of three years old . . . because test results proved

After 119,503 miles... still above AAR specifications!

Some just-completed tests of ASF Cast-Steel Unit Brake Beams will interest every railroad looking for ways to cut maintenance costs.

The beam shown here is one of a set that has traveled 119,503 miles during 34 months —on a Wilson Car Lines Refrigerator Car. Refrigerator service was deliberately chosen for the test because brine-induced corrosion makes it extra tough on running gear.

Before testing, the four beams were shot-blasted to remove rust and scale. Measurement showed practically no loss of dimension or misalignment—and extremely light wear, considering length of service. For example, unit extensions were only about 1/16" undersize! And, *here are the results of static and fatigue tests—made according to AAR specifications:*

	STATIC TEST		FATIGUE TEST	
	Deflection at 18,000 lbs.	Set, after 30,000 lbs.	Maximum load before fracture	18,000 lb. loadings
AAR Requirements	.070"	.010"	(None)	750,000
Average performance of ASF Unit Beams in service 3 years	.056"	.0012"	68,950 lbs.	1,032,181

In short, still far above standards! Find out more about the beam that *maintains* its strength and shape during *prolonged service . . . and reduces your maintenance and replacement costs.* Write us, or ask your nearest ASF Representative for more information!

Like modern side frames that replaced arch bar trucks . . . the MODERN BRAKE BEAM is the

ASF One-Piece Cast-Steel UNIT BRAKE BEAM

AMERICAN STEEL FOUNDRIES

410 North Michigan Avenue, Chicago 11, Illinois

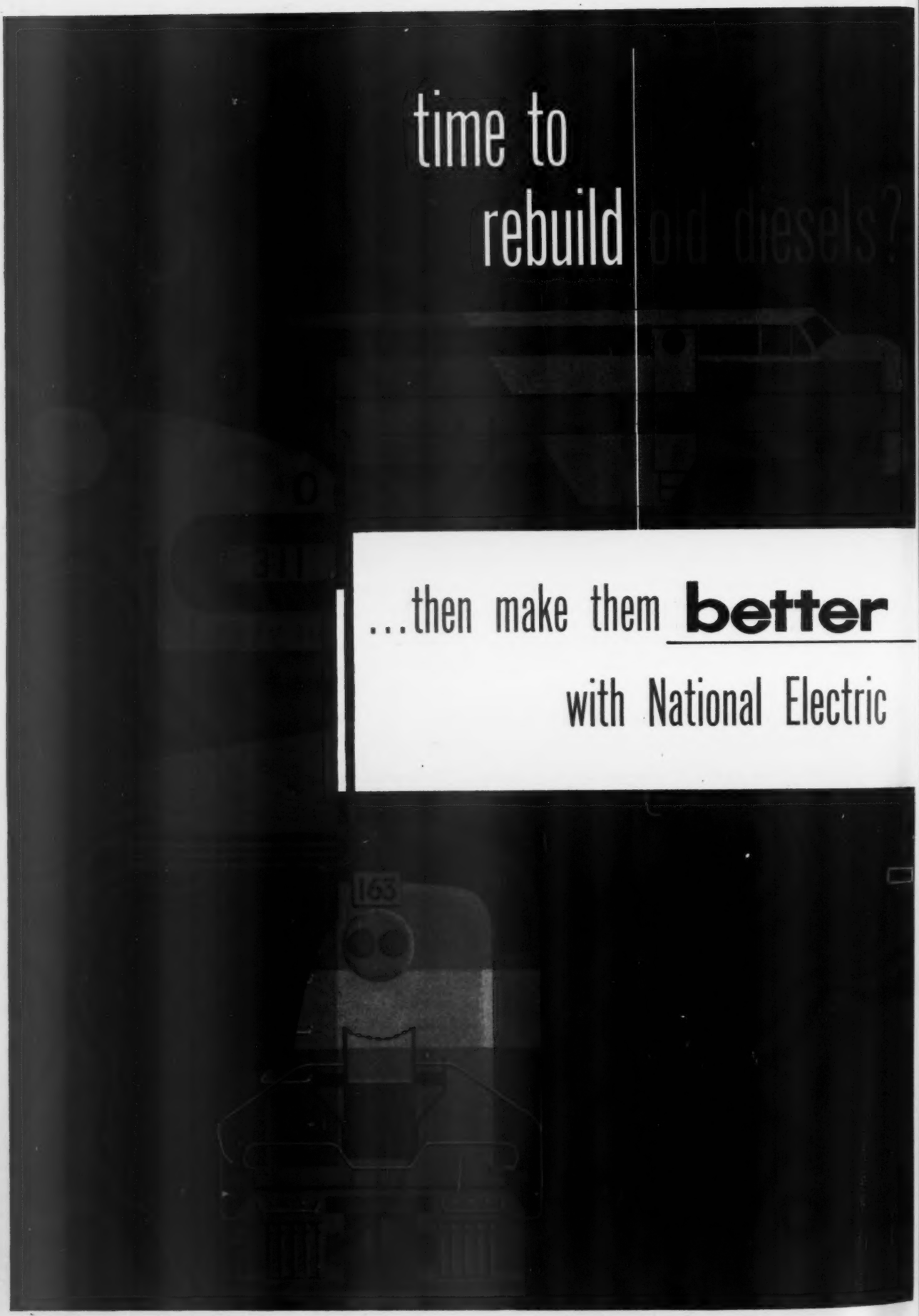
Look for this MINT ○ MARK on the running gear you specify

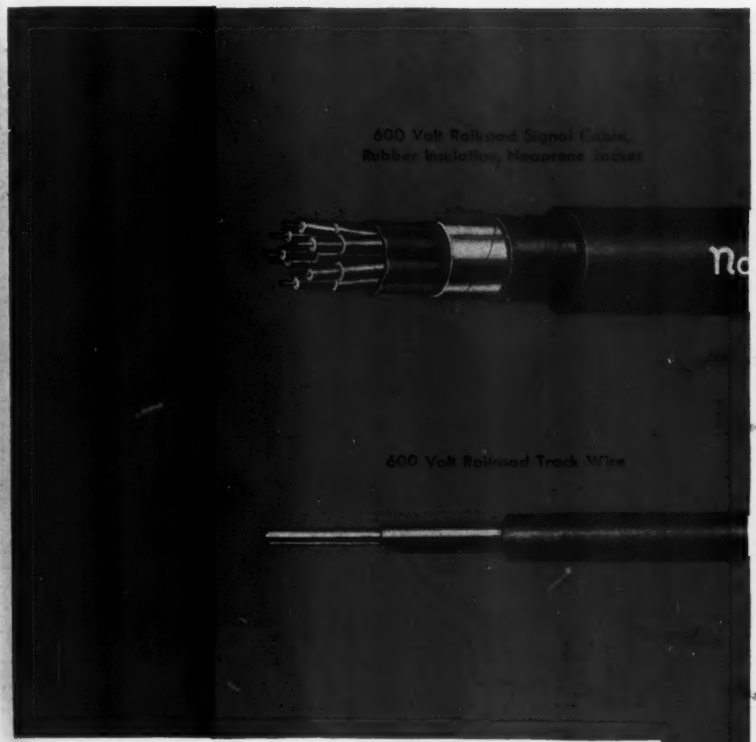
Canadian Sales: International Equipment Co., Ltd., Montreal

time to rebuild old diesels?

...then make them **better**

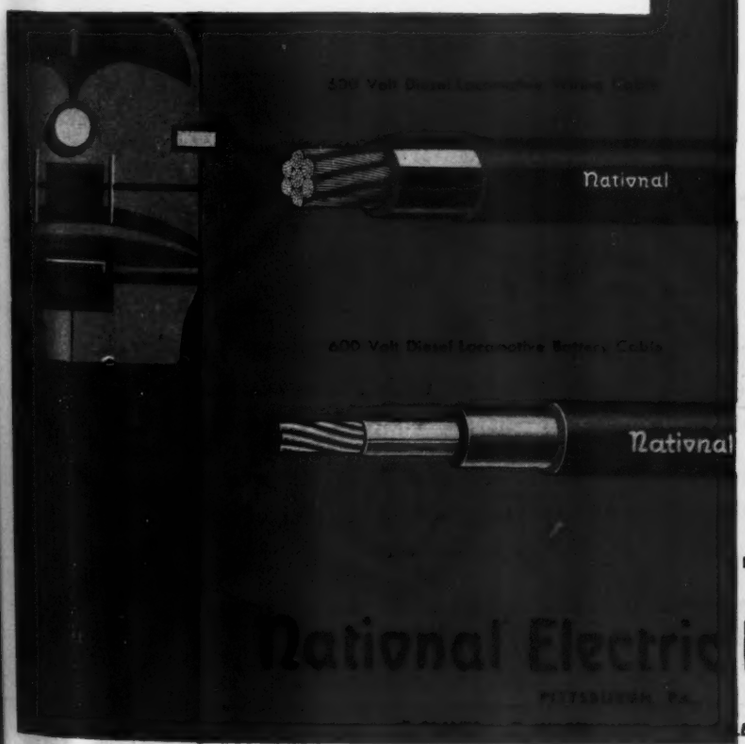
with National Electric





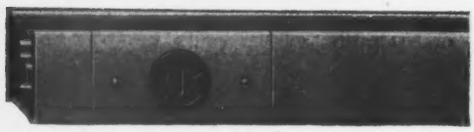
than new

wiring materials



National Electric Wirewā
(with hinged covers)

National Electric Surfaceduct
(with snap-on capping)



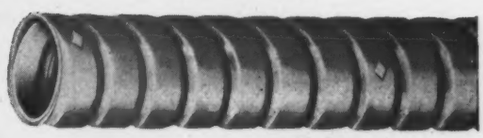
If your company's diesel locomotives have seen long service and are ready to rebuild—then the National Electric representative is the man you want to see. He can show you how modern, versatile National Electric Railroad Wiring Materials can *speed up* your job . . . improve your wiring layout . . . and at the same time *reduce rebuilding costs!*

Many railroads have discovered they can eliminate wiring bugs and short circuits . . . replace miles of conduit with one, easily accessible raceway . . . improve efficiency and appearance of engine rooms and cabs with National Electric Products. In fact, locomotives rewired with NE wiring materials are actually *better than new!*

Send for the new railroad catalog. It lists "Everything in Wiring for the Railroads."

National Electric Sherarduct
(rigid steel conduit)

National Electric Flexsteel
(flexible conduit)



EVERYTHING IN WIRING FOR THE RAILROADS

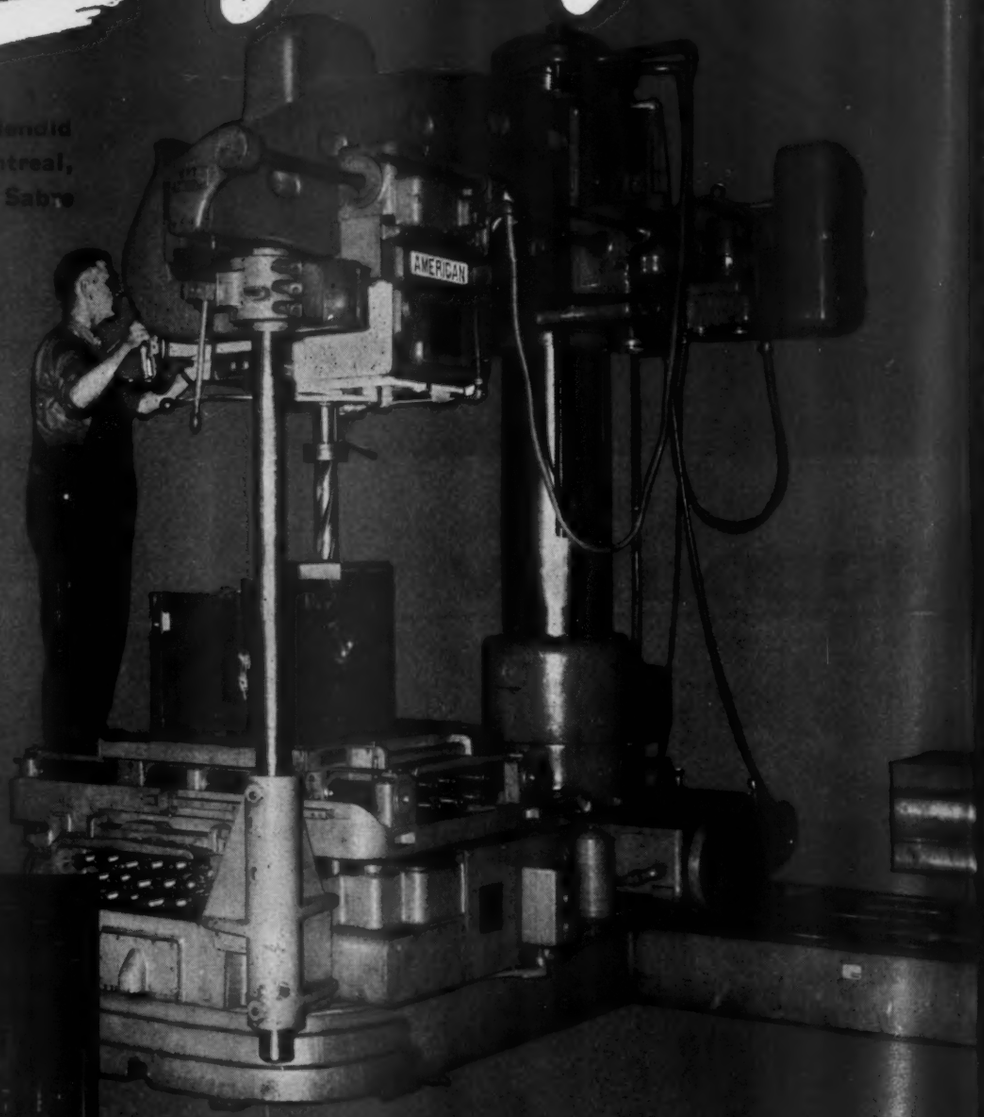
Products

LES OFFICES

On TOP of his job!

This operator is doing a splendid job at Canadair Limited, Montreal, on the production of F-86E Sabre Jets for the RCAF and, as the illustration shows, he is right on top of his job, too.

He is proud of his fine new 6' 17" column "AMERICAN" Hole Wizard Radial. "It's powerful; it's sturdy; it's easy to operate, and I'm not worn out at the end of the day". What more could any operator ask? As a consequence he turns out a lot of fine work which makes his machine a paying investment for the company.



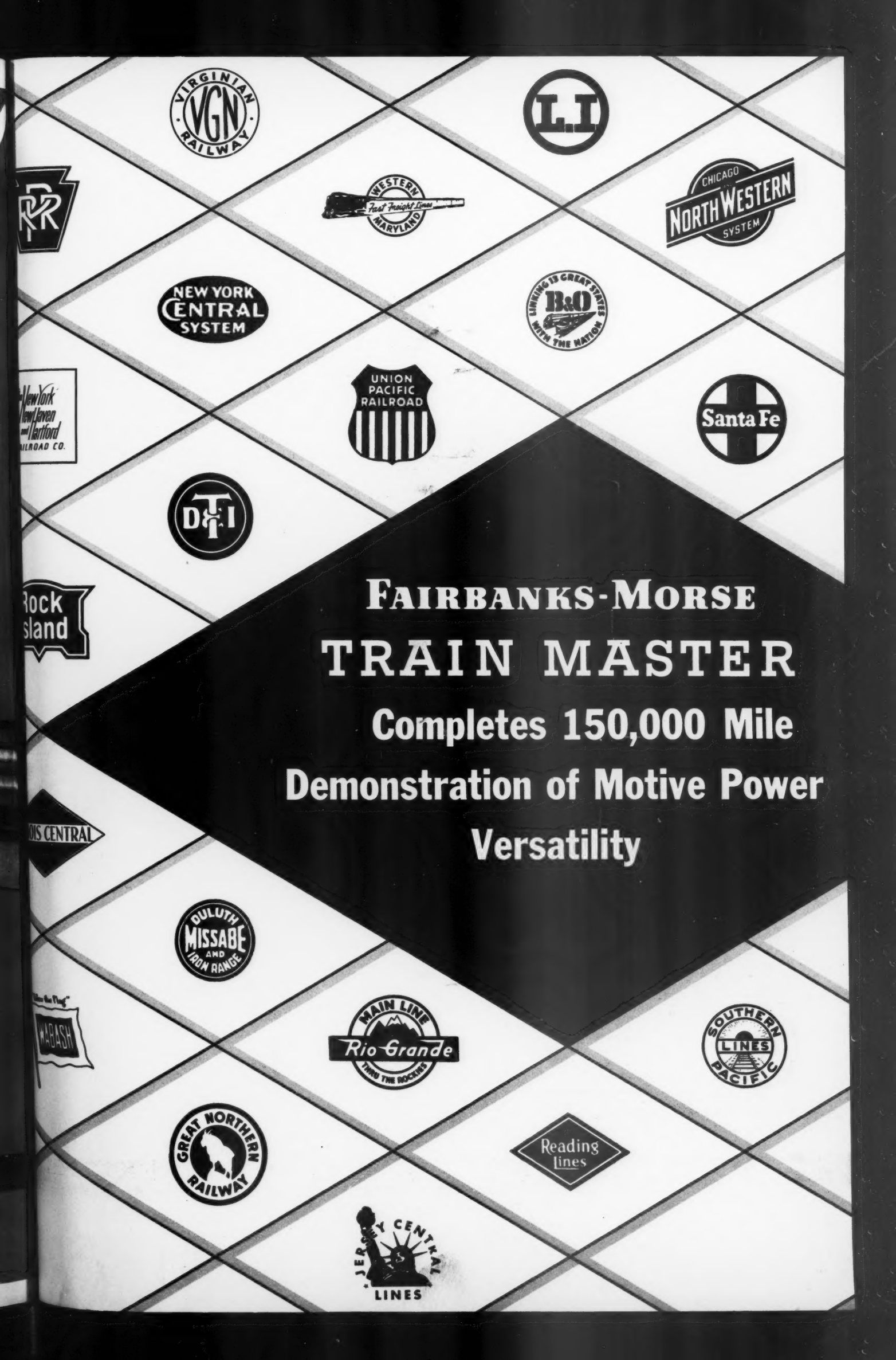
This *"American"* Hole Wizard Radial has a right angle base, on one wing of which is mounted a Bullard Man-Au-Trol Spacer—as shown by the illustration.

"AMERICAN" Hole Wizard Radials are playing a prominent part in the production of critical defense items for both the U. S. A. and Canada.

For a complete revelation of their virtues send for descriptive bulletin No. 327.

THE AMERICAN TOOL WORKS CO. Cincinnati 2, Ohio, U. S. A.

LATHES AND RADIAL DRILLS


VIRGINIAN RAILWAY
VGN
L.I
CHICAGO NORTH WESTERN SYSTEM
WESTERN MARYLAND
Fast Freight Lines
NEW YORK CENTRAL SYSTEM
B&O
LINKING 13 GREAT STATES WITH THE NATION
UNION PACIFIC RAILROAD
Santa Fe
D&T I
Rock Island
FAIRBANKS-MORSE
TRAIN MASTER
Completes 150,000 Mile
Demonstration of Motive Power
Versatility
DULUTH MISSABE AND IRON RANGE
WABASH
MAIN LINE
Rio Grande
THRO THE ROCKIES
SOUTHERN PACIFIC LINES
GREAT NORTHERN RAILWAY
Reading lines
LINES

In Passenger Service . . . Train Masters maintained on-time schedules on name trains across the country . . . on l
and passenger extras. Train Master performance *proved* their ability to handle this service.

Tomorrow's Motiv

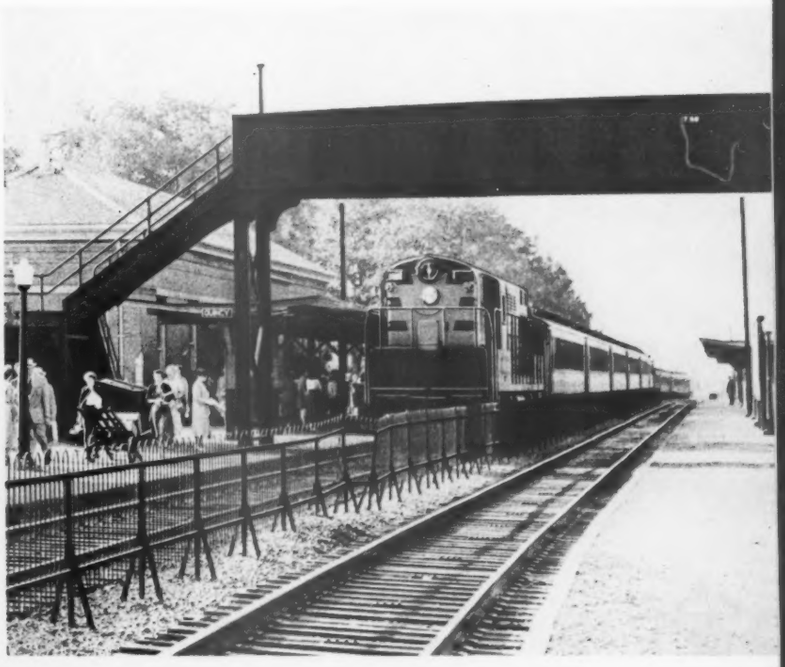
Hauling Heavy Drags . . . as here on the Mesabi Range showed the power and rugged stamina of the world's most powerful single-diesel locomotive on the rails today. Train Master Performance *proved* that Opposed Piston Diesel power and TM versatility is the right combination for all heavy-duty service.

Pulling Heavy Freight . . . Train Master dem
strated that its high tractive effort on the upgr
and high dynamic braking on the downgrade co
haul and effectively control high tonnages.
grade or down, Train Master's performance pro
that this locomotive is always master of its tr

On-Time Freight . . . where every railroad saw TM power move higher tonnages faster over steep grades in difficult territories. Train Master performance *proved* that higher ton-miles per train-hour can be scheduled *now*.

lower TODAY

per Service . . . Such is the versatility of the Train Master even this service is an ideal application. Train Master performance *proved* its ability at helper stations as elsewhere on the



On Suburban Runs . . . Train Master's fast acceleration and power helped keep the tightest scheduled runs and turn-arounds on schedule. Again, Train Master performance *proved* its ability to solve another difficult motive power problem.

PERFORMANCE PROVED

FAIRBANKS-MORSE

TRAIN MASTER

the most useful locomotive ever built

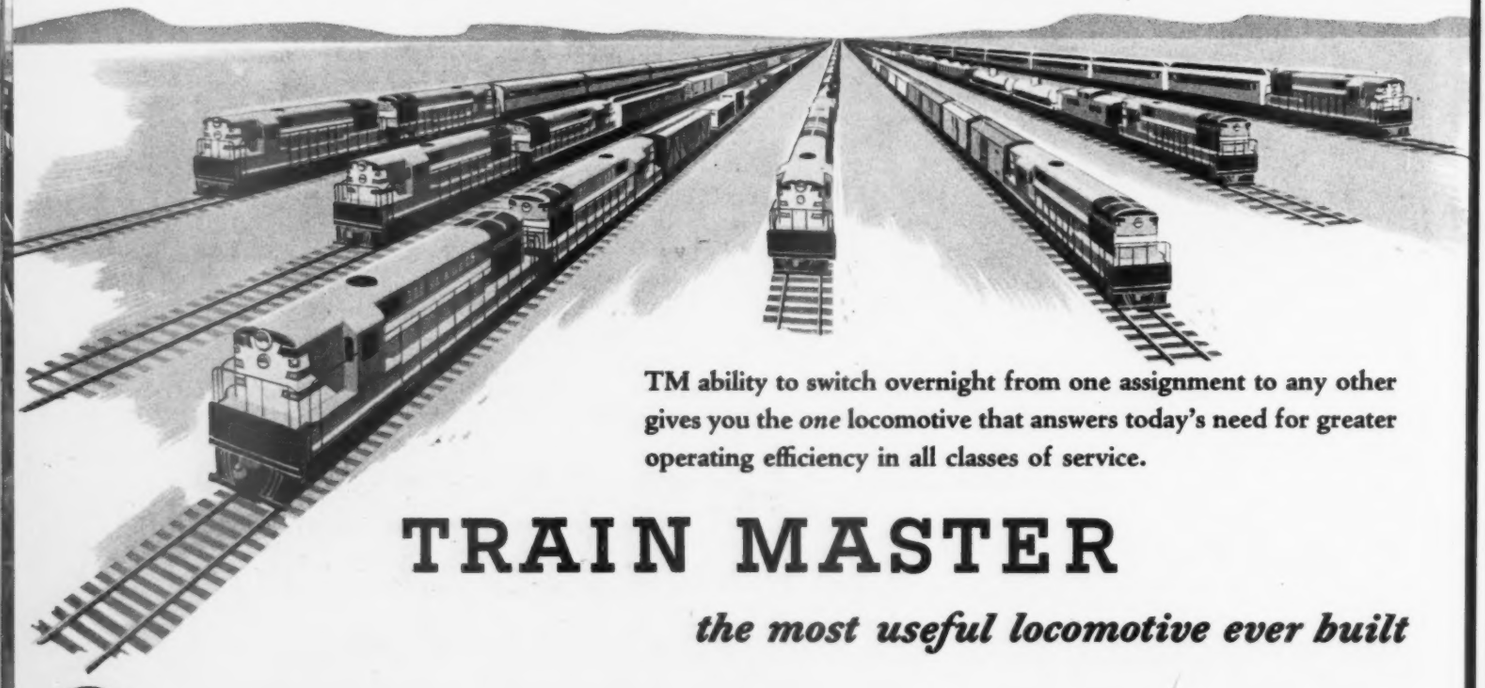
150,000 Miles of Proof

Nowhere else than on the rails can you prove the worth of a new concept in motive power design. After eight months of demonstration in every type of service, over many of the country's toughest territories—Train Master performance has proved that the combination of . . .

POWER	CAPACITY	WEIGHT	BRAKING	HEATIN
2400 horsepower of Fairbanks-Morse Opposed Piston Diesel power	Six heavy-duty, high-capacity traction motors	Total weight of 375,000 pounds —all on drivers	3000 horsepower Dynamic Brake	4500 lb/hr steam generat

. . . makes the TRAIN MASTER ideally suited for . . .

Passenger . . . Mail and Express . . . Fast Freight . . . Drag Freight . . . Hump and Yard . . . Helper . . . Extra Servi



TM ability to switch overnight from one assignment to any other gives you the *one* locomotive that answers today's need for greater operating efficiency in all classes of service.

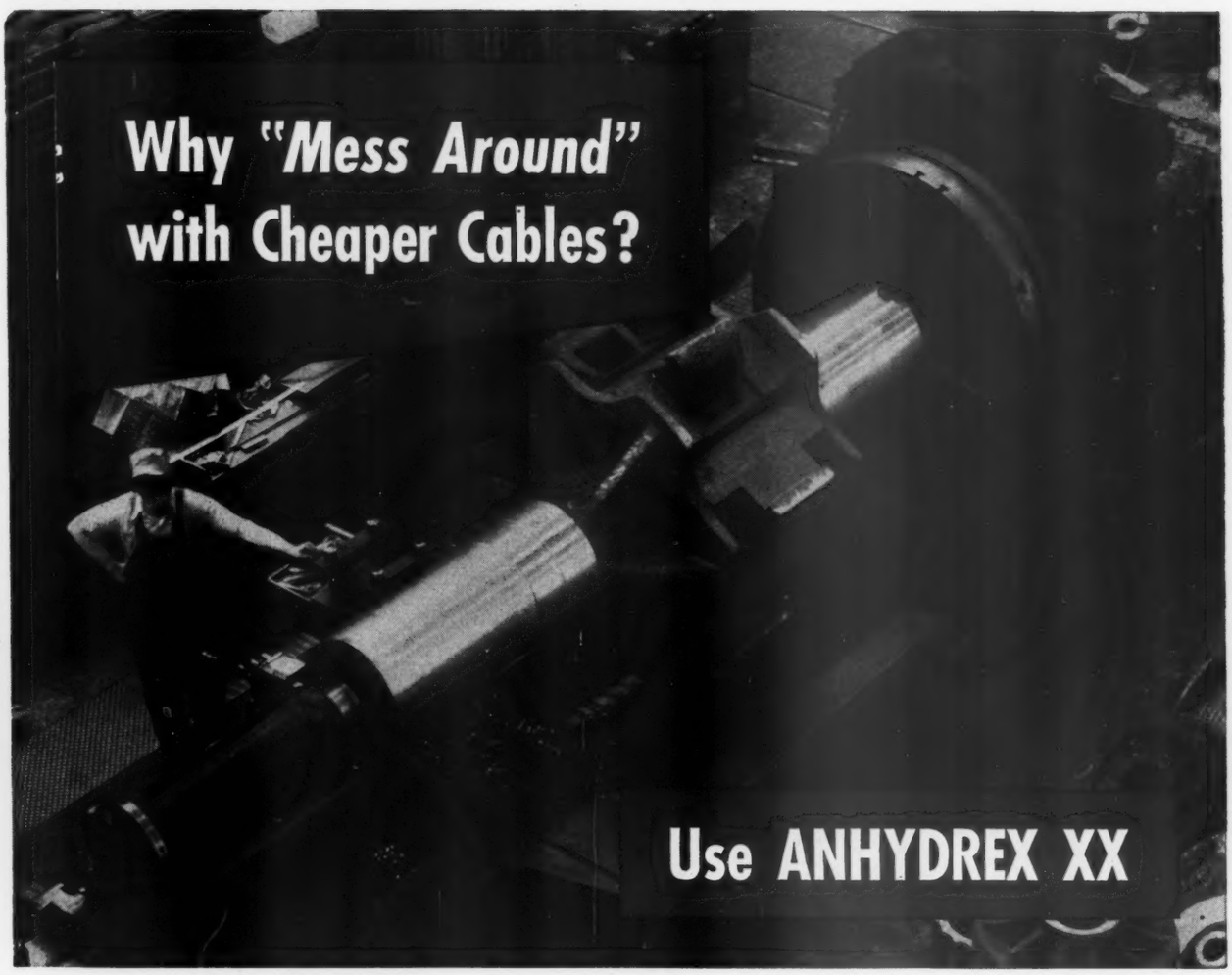
TRAIN MASTER

the most useful locomotive ever built

FAIRBANKS-MORSE

a name worth remembering when you want the best

DIESEL LOCOMOTIVES AND ENGINES • RAIL CARS AND RAILROAD EQUIPMENT • ELECTRICAL MACHINERY • PUMPS • SCALES WATER SERVICE EQUIPMENT • HAMMER MILLS • MAGNETOS



The power distribution system in your roundhouses, diesel shops, car rebuilding shops, etc., represents at most only a few per cent of the total cost of the plant. Yet that entire plant investment rests on the satisfactory functioning of your cables. It depends upon those few per cents.

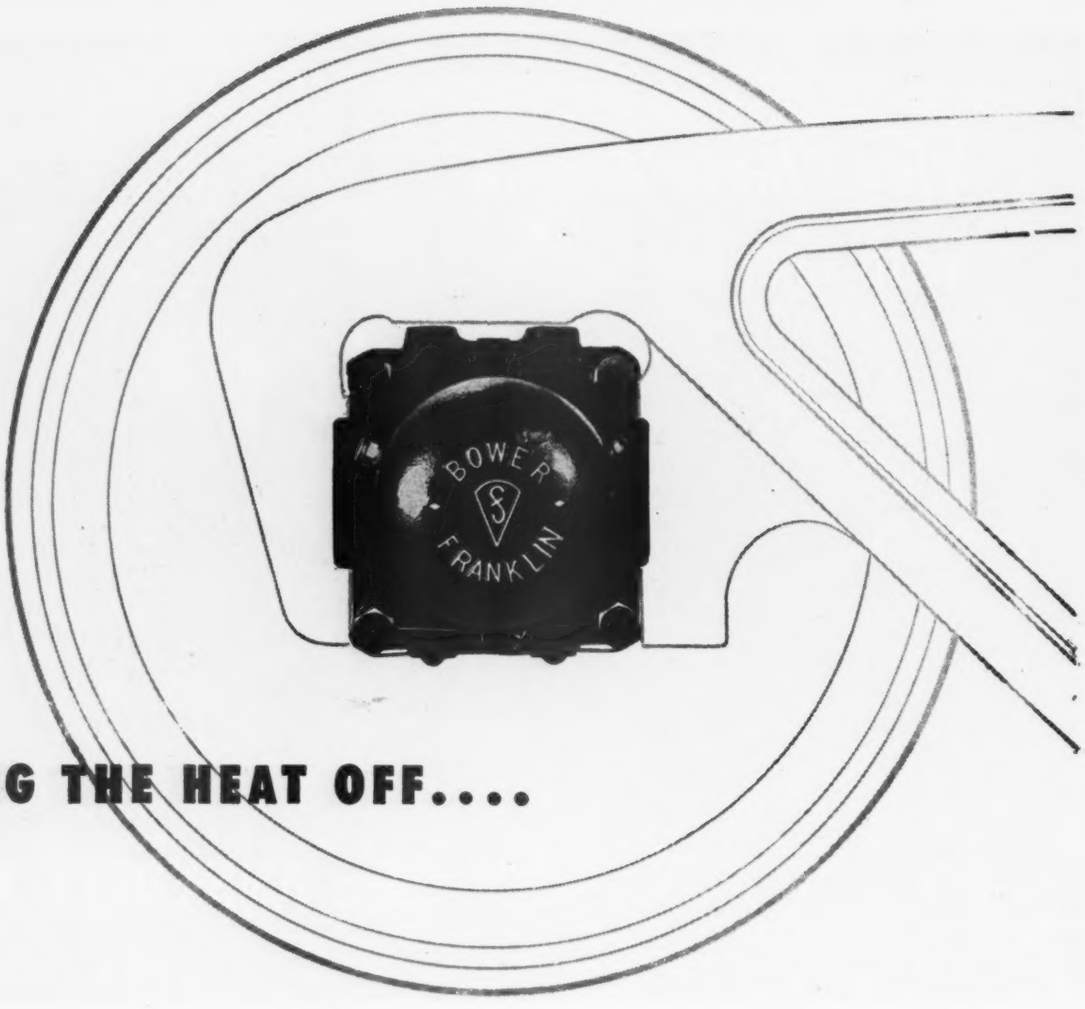
Does it make sense, then, to quibble about a hundred dollars, or even five hundred dollars, in cable cost when the functioning of your plant and its profitable operation may involve thousands and even hundreds of thousands of dollars? Of course it doesn't make sense! That's why you shouldn't take chances.

There's no need of taking chances when dependable Simplex-ANHYDREX XX High Voltage Feeder Cables are available at practically the same price as ordinary cables. Here are a few of the advantages you get with cables having this superior insulation: They will withstand a greater concentration of ozone. They have exceptional resistance to both heat and aging. They will not absorb more than 15 milligrams of water when tested in accordance with U.S.C.G. specifications. In fact, no Simplex-ANHYDREX Cable has ever failed due to water absorption.

Why not specify Simplex-ANHYDREX XX High Voltage Feeder Cables? They assure you of top quality and trouble-free service year in and year out. Contact your nearest Simplex representative for more complete information or write to our Railroad Department at the address below.

Simplex WIRES & CABLES

SIMPLEX WIRE & CABLE CO., 79 Sidney Street, Cambridge 39, Massachusetts



TAKING THE HEAT OFF....

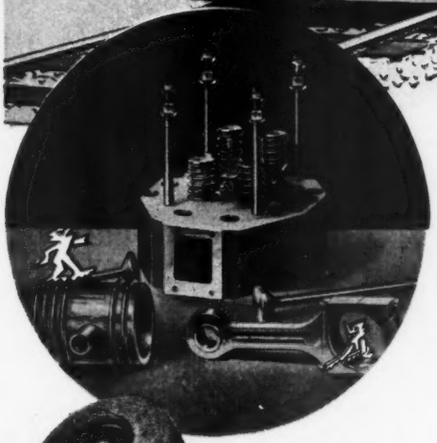
Bower-Franklin journal boxes, equipped with dependable Bower straight roller bearings, are ready to help you carry more freight — at greater speeds — with no danger of hot boxes.

These high-quality bearings have already *proved* themselves in numerous other types of heavy-duty equipment — steel rolling mills, heavy trucks, earthmovers, cranes, shovels, and railroad generator-drive units, to mention but a few.

Sales and application engineering for the Bower-Franklin journal boxes are being handled by the Franklin Balmar Corporation. Additional information will be furnished on request.

FRANKLIN BALMAR CORPORATION

FRANKLIN BALMAR CORPORATION
WOODBERRY, BALTIMORE 11, MARYLAND
CHICAGO OFFICE: 5001 North Wolcott Ave., Chicago 40



WEARMITES

Make Dirty Oil Expensive

Grit, Dirt and Tarry Sludge are the invisible mites of wear that cost so much in maintenance and down time of Diesel Engines. Yes, Wearmites make dirty lubricating oil expensive . . . too expensive for any railroad.

WIX Engineered Filtration rids diesel lubricating oil of WEARMITES thoroughly, constantly, economically. And, you have in WIX Engineered Filtration, a selection of filtering media so that you may provide a "prescription formula" to suit your equipment, type of service or particular climatic conditions.

Keep the oil in your Diesel Locomotives free from Wearmites . . . you'll keep maintenance costs down and engine performance up. Write for complete information today!

ENGINEERED FILTRATION

Precision construction . . . controlled density . . . uniform quality . . . self-contained sealing gaskets and many other WIX *plus* features add up to WIX Engineered Filtration. Whether for Lubricating or Fuel Oil, crush-proof, non-collapsible WIX Filter Cartridges show a decided dollars and cents advantage for you.

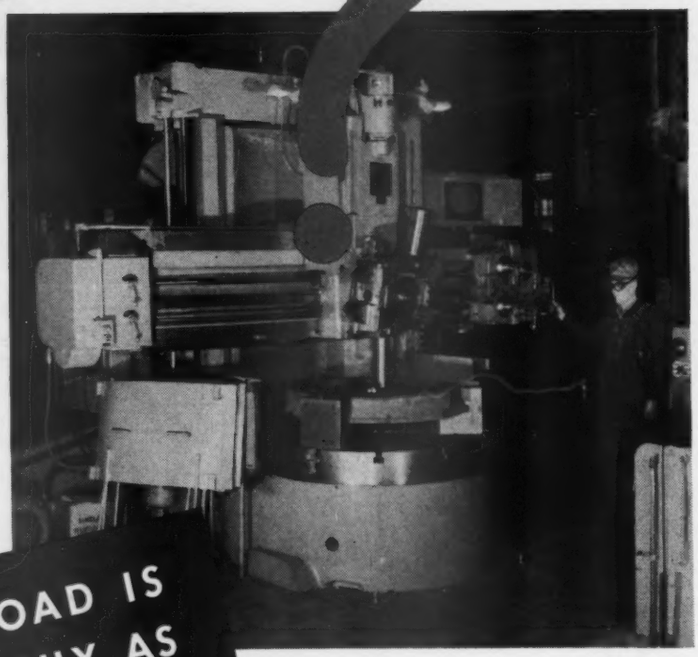
LUBE wix FUEL

RAILROAD OIL FILTERS

WIX CORPORATION · GASTONIA, N. C.

WAREHOUSE STOCKS IN: GASTONIA • ATLANTA • NEW YORK • CHICAGO • ST. PAUL • ST. LOUIS • SACRAMENTO

CAN RAILROADS BE MODERN Without Modern MACHINE TOOLS



A RAILROAD IS REALLY ONLY AS MODERN AS ITS MACHINE TOOLS

It is a fact that a railroad's shops — their personnel — the tools they work with — constitute the Invisible Background of Railroad Progress. *Modern machine tools* are basic in any well-rounded improvement program. How well your shops are equipped has a vital bearing on company earnings.

In every part of the country, Bullard Machine Tools are making important contributions to more efficient shop operation. Shown in the illustration above is a close-up of a 54" Man-Au-Trol V.T.L. machining the hub of a 40" Diesel wheel at the Diesel shop of a prominent mid-western railroad. The Man-Au-Trol can be used as an automatic machine or operated by manual controls which provide great flexibility for a wide range of jobs.

The modern Bullard line points the way to important shop economies.

Write today for complete information.

THE

BULLARD COMPANY

Bridgeport 2, Conn.

Phone — Bridgeport 6-2511

BULLARD

One of 550 Gondolas . . . built for Chicago, St. Paul, Minneapolis and Omaha Railway Company . . . with side plates of Bethlehem Steel Company's *Mayari R*, a high strength low alloy steel containing nickel. *Mayari R* is used for side plates in a gondola body because these are usually subject to greatest punishment.

Aiming for 20-year car life?

Try a steel that resists corrosion, combats battering and piercing, shock and abrasion

Aim for 20 to 24 years of car life . . .

Aim for minimum maintenance and maximum use per dollar invested . . .

Utilize high strength low alloy steels containing nickel. Records show, for example, that steel of this type gave virtually double the life obtained from carbon steel of the same thickness under identical conditions in coal-carrying hopper cars . . . where hard usage and, particularly, corrosion, pose major maintenance problems.

Along with resistance to corrosion, nickel-containing high strength low alloy steels *combine qualities such as ability to withstand shocks, battering and piercing, as well as abrasion.* In addition, this type shows excellent response to forming and welding.

Moderate in cost, and produced under various trade names by leading steel companies, high strength low alloy steels containing nickel along with other alloying elements are especially suited to minimize maintenance labor and expense in railroad applications.

Consult us on the use of these steels in your products or equipment. Write today.

500 New 50-Ton Hopper Cars . . . similar to the all-welded type shown here . . . were recently built for the Delaware, Lackawanna and Western Railroad. All plates that come in contact with the coal load are of Bethlehem Steel Company's *Mayari R*. This high strength low alloy steel containing nickel provides increased resistance to corrosion, battering and piercing, as well as to shock and abrasion.

290 Class X41 Box Cars . . . built for the Pennsylvania Railroad . . . utilized Bethlehem Steel Company's nickel-alloyed *Mayari R* for various parts. These 50′ automobile-type cars weigh 1.36 lbs. less per cu. ft. of capacity than those previously built of carbon steel. Use of *Mayari R* cut deadweight 6730 lbs. per car, or a total of 975 tons in the 290 cars.

INCO

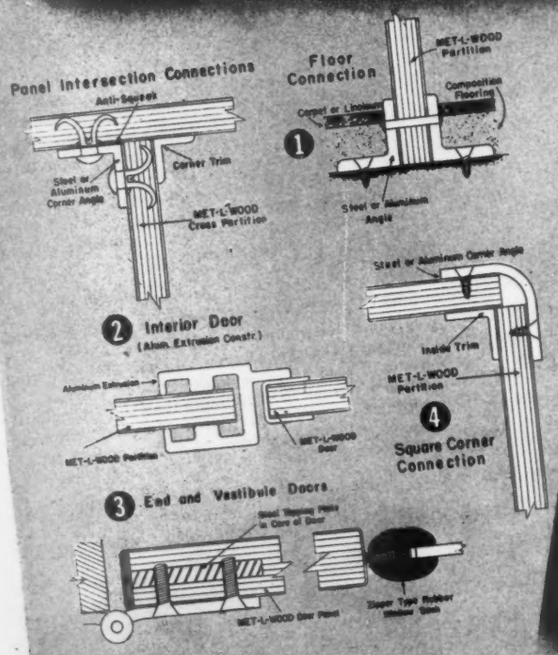
THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.

MET-L-WOOD
METAL BONDED TO PLYWOOD

VERSATILITY
FOR MODERN CAR INTERIORS

Met-L-Wood walls provide a smooth, luxurious finish in addition to saving weight and simplifying construction.

MET-L-WOOD passenger car partitions, doors and paneling not only produce beautiful finished surfaces, but can also save up to 73%* in weight and a substantial amount of construction time. Shown at left, and described below are typical Met-L-Wood construction details. Full information on Met-L-Wood versatility in new or rebuilt cars will be furnished promptly on request. Write today.



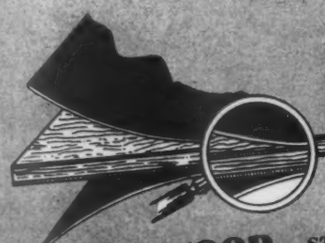
❶ Panel intersections with Met-L-Wood can be made invisible from outside with the use of split rivets. Floor connections may be made in a variety of ways, one of which is shown here, using through-rivets and metal screws.

❷ Interior doors of Met-L-Wood can be fitted with aluminum extrusion door stops; or the Met-L-Wood partition formed so that the door stop is an integral part of the panel.

❸ Steel tapping plate inserts can be put in Met-L-Wood doors at proper places for solidly anchoring hinges and door-opening devices. Note simplicity of using zipper-type window sash with pre-formed Met-L-Wood window openings.

❹ Square or rounded corners are made with Met-L-Wood panels and steel or aluminum corner forms. Corner forms can also be fastened with split rivets or through-rivets, as well as with wood or metal screws.

**Met-L-Wood panels ⅜" thick, with steel both sides, have a stiffness factor exceeding that of ¼" solid steel plate, while weighing only 27% as much as steel!*



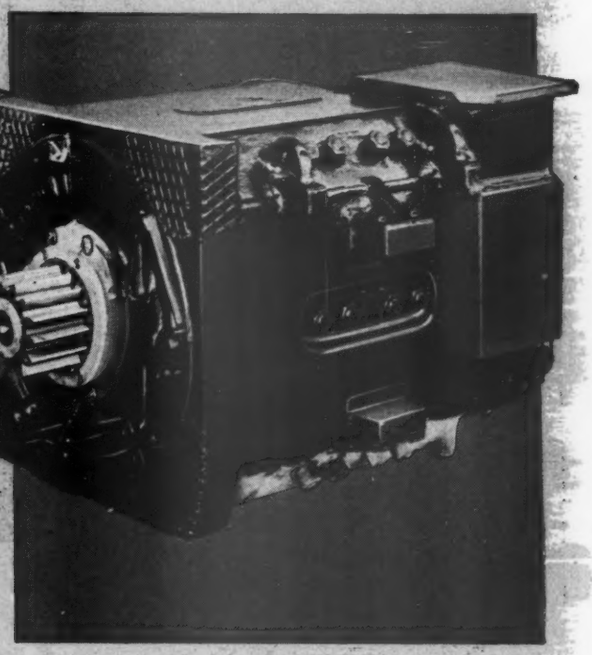
MET-L-WOOD CORPORATION

6755 West 65th Street, Chicago 38, Illinois

MET-L-WOOD • *STRONG... LIGHT... Smooth Finish... Sound Deadening... Fire-Resisting... Insulating*

Your most dependable traction motor armature-bearing lubricant

SHELL CYPRINA GREASE 3



. . . for trouble-free service from shopping to shopping

THE armature bearings in all types of diesel-electric units run for much longer periods before shopping . . . when the lubricant is Shell Cyprina Grease 3. That holds for the pinion end bearings too, where conditions are really severe.

Shell Cyprina Grease 3 has outstanding stability . . . gives hard-working machine parts superior anti-wear lubrication. It remains stable under extreme changes in operating temperatures. Performance records on many railroads prove the superior service life of this special lubricant, Shell Cyprina Grease 3.

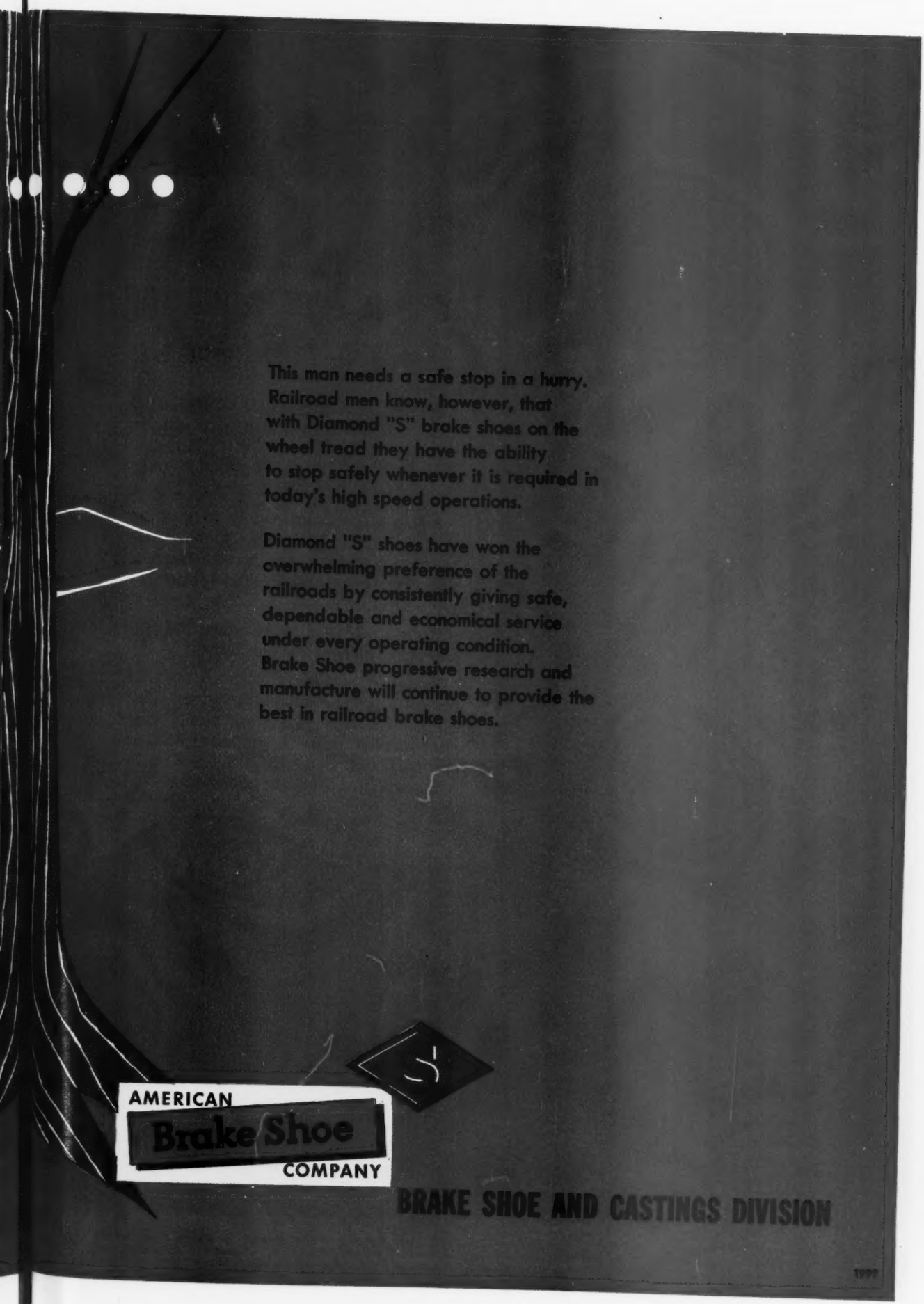
For technical information, see your Shell Railroad Service Engineer or write to:

SHELL OIL COMPANY

50 WEST 50TH STREET, NEW YORK 20, NEW YORK
100 BUSH STREET, SAN FRANCISCO 6, CALIFORNIA
SHELL BUILDING, ST. LOUIS 3, MISSOURI

SHELL

stop...


This man needs a safe stop in a hurry. Railroad men know, however, that with Diamond "S" brake shoes on the wheel tread they have the ability to stop safely whenever it is required in today's high speed operations.
Diamond "S" shoes have won the overwhelming preference of the railroads by consistently giving safe, dependable and economical service under every operating condition. Brake Shoe progressive research and manufacture will continue to provide the best in railroad brake shoes.
AMERICAN
Brake Shoe
COMPANY
BRAKE SHOE AND CASTINGS DIVISION

"SCOTCH" Plastic Tape takes a 2-year beating

(*and it's <u>still</u> going strong!*)

See where those cables from the take-up shoe enter the conduit? Two years ago the men in the New York Central shop in Harmon, N.Y., sealed these junctions with "Scotch" No. 22 Plastic Electrical Tape.

And now look. Practically as good as new! "Scotch" No. 22 has weathered wind-blown sand and grit, broiling sun, freezing cold, driving rain and sleet. And it doesn't leak a drop.

"Scotch" 22 does not deteriorate. It resists acids, alkalies and oils, too.

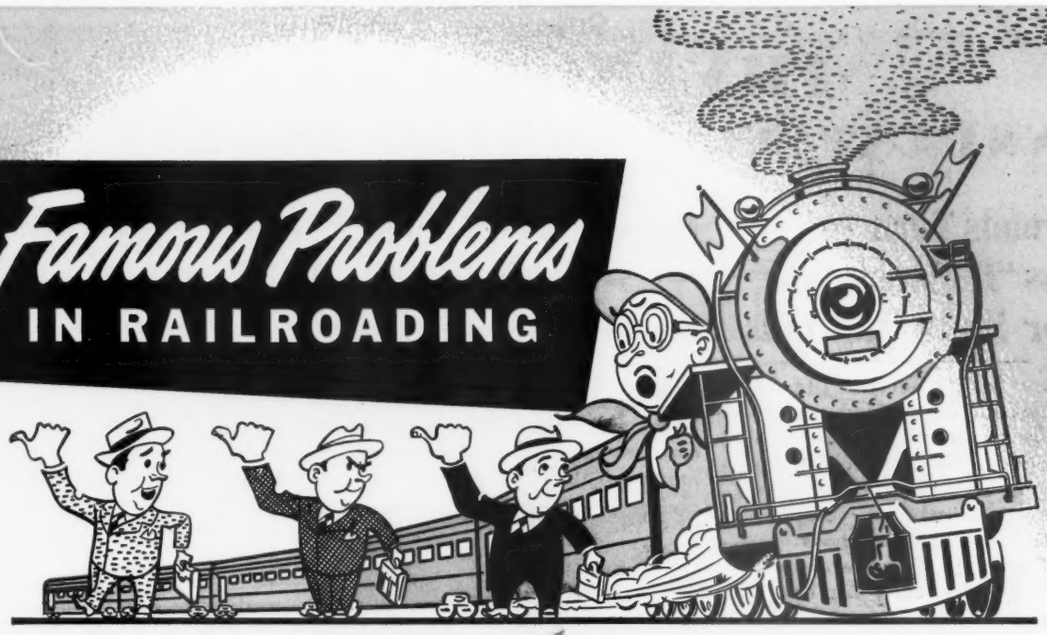
Try it for *all kinds* of insulating and protecting jobs! Available in 36-yard rolls. Standard widths: ½", ¾", 1" and 2". See your supplier, or write Minnesota Mining and Mfg. Co., Dept. RC-123, St. Paul 6, Minnesota, for complete information.

SCOTCH BRAND
Electrical Tape
No. 22

3M COMPANY

The term "Scotch" and the plaid design are registered trademarks for the more than 300 pressure-sensitive adhesive tapes made in U.S.A. by Minnesota Mining & Mfg. Co., St. Paul 6, Minn.—also makers of "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotch-lite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing, "3M" Abrasives, "3M" Adhesives. General Export: 122 E. 42nd St., New York 17, N.Y. In Canada: London, Ont., Can.

Famous Problems IN RAILROADING



Jones, Smith and Brown hire a special train to take them from New York to San Francisco. Jones gets on in New York. Smith gets on halfway across the country. Three-quarters of the way across the country, Brown gets on. All go to San Francisco, and each returns to the spot where he boarded the train. If the total fare was $6,720, how much should each man pay for his share of the ride?

See next month's Spicer Generator Drive advertisement for correct answer.

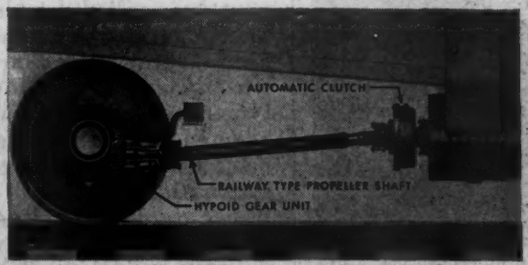
ANSWER TO NOVEMBER PROBLEM

If it takes X trains X days to move the freight, then they move 1/X part in one day. Each train therefore moves $1/X \times 1/X = 1/X^2$ of the freight in one day. With 6 more trains, the total number of trains working is X plus 6. Since they move the freight on one day, each train moves $\frac{1}{X+6}$ of the freight in one day. Thus we have two ways of showing the amount of freight that one train moves in one day $\frac{1}{X^2} = \frac{1}{X+6}$ or, $X^2 = X + 6$. Solving, $X = -2$, or $X = 3$. Eliminating the negative factor, we get the correct answer: 3 trains were being used.

Famous Solutions TO RAILROADING PROBLEMS

You know *how much* electrical energy you need per car and per train. But do you know how much this electricity costs you?

Records kept by many of the 70 American railroads operating over 10,000 Spicer Generator Drives show attractively low operating figures. That's because the Spicer Drive uses modern, efficient principles in delivering driving power from the axle to the generator. No sloppy, slipping, slapping, power-losing drive. No stalling from ice or snow. No worries about dust and dirt. No danger from shocks or overloading. Yes, you can depend upon the Spicer for real service in generating ample power for lighting, air-conditioning, refrigeration, radios, telephones, and all other electrical needs.



Spicer Positive Railway Generator Drives can be quickly and economically adapted to new car designs and reconditioning jobs.

Write for illustrated literature.

The Spicer Railway Generator Drive is manufactured, sold and serviced by

SPICER MANUFACTURING DIVISION
OF DANA CORPORATION
TOLEDO 1, OHIO

49 YEARS OF Spicer SERVICE

IRVINGTON INSULATING VARNISH DIGEST

Railroads Turn to Class "H" Insulation For Motor Rewinds

To assure longer service life between rewinds of traction motors, generators and auxiliary electrical equipment, railroad repair shops are making increased use of Class "H" insulation which withstands continuous operating temperatures as high as 385°F., and has a short-time overload capacity for operation at 500°F.

Major types of Class "H" insulation produced by Irvington for use in railroad equipment rewinds include:

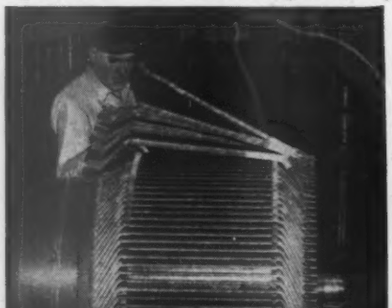
Fiberglas* impregnated and coated with silicone resin or coated with silicone rubber.

Asbestos coated or saturated with silicone resin.

Fiberglas coated with Teflon**.

Silastic*** Tape.

*® Owens Corning Fiberglas Corp.
® du Pont *® Dow Corning



Irvington Class "H" insulation gives long life at high temperatures on railroad equipment.

Insulating Varnishes

The Irvington line of insulating materials also includes a group of insulating varnishes of both internal curing and conventional baking types. Internal curing varnishes have long been recognized as giving excellent bonding characteristics, and a new addition to the line —Irvington No. 140—is characterized by its exceptional ability to prevent movement of conductors in windings operating under conditions of very severe vibration.

Information on Class "H" insulation and on insulating varnishes is available on request.

Dipping Gives Good Winding Penetration With Simple, Moderate-Cost Equipment

Method is Extensively Used for the Application of Insulating Varnish to Electrical Equipment

The dipping procedure offers an excellent method of impregnating electrical windings with insulating varnish, provided the windings are not constructed in a manner necessitating the more thorough impregnation made possible by the use of vacuum or pressure types of application.

Dipping provides an economical means of applying insulating varnish to many types of electrical windings.

Varnish Consistency Should be Checked Before Application

Insulating varnishes are usually supplied at a somewhat heavier consistency than is required for application, and should be thinned with suitable solvents.

Once the proper consistency to give the desired film thickness has been determined by experiment, a viscosity reading should be taken. The varnish should be maintained at this viscosity to insure uniform results. Many viscosity measuring devices are available, most of which are easy to use.

Viscosity should be checked daily and adjusted to the proper viscosity with the solvent recommended for the particular varnish. Since viscosity varies with temperature, it is important that the varnish temperature be the same each time a check is made.

Outstanding advantage of the dipping method is the relative simplicity of the equipment involved, as well as of the production procedures. The dipping tanks are usually made of steel, although heavy galvanized iron is also used successfully. Tanks should be equipped with closely fitted counterbalanced covers, and provided with outlets for draining off the varnish to permit cleaning. They must also be of sufficient size to allow complete immersion of the pieces to be treated without causing any large change in varnish temperature.

Preparation of Units

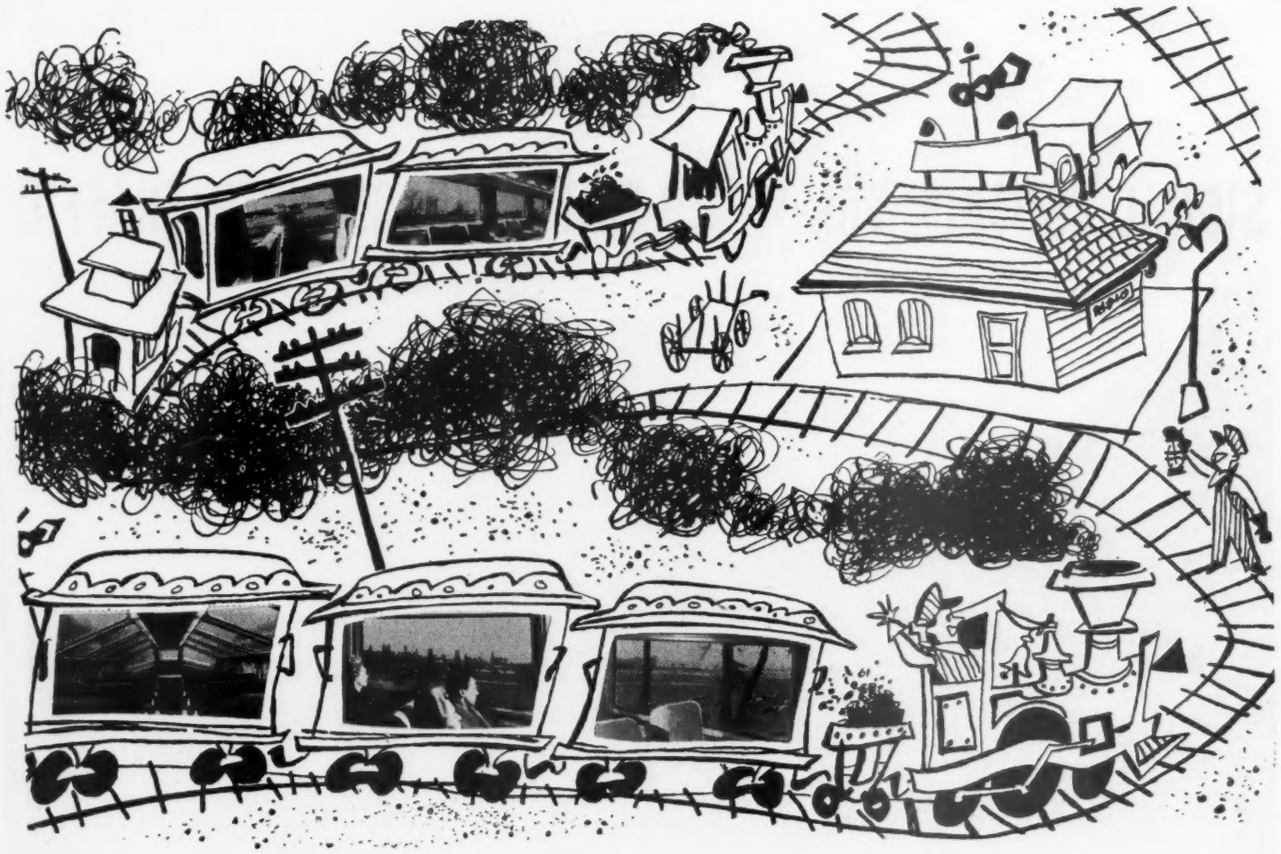
Units should be cleaned, dried and preheated before immersion in the varnish. They should remain in the varnish until all air bubbles cease rising to the surface. Longer immersion will assure more thorough impregnation. Units should be withdrawn slowly and allowed to drain until dripping ceases.

Types of Varnish

Both the conventional baking and the internal curing types of varnish manufactured by Irvington may be applied by the dipping method. It should be noted, however, that the internal drying types, which cure throughout by polymerization, are particularly adapted to the impregnation of deep windings. To assure the deep penetration for which these varnishes are designed, it is advisable to consider the use of vacuum or pressure equipment when unit construction hinders varnish passage.

Irvington's Research Department is prepared to assist varnish users in selecting types of electrical insulating varnishes for specific applications, and to advise on methods of application and baking schedules.

(For further information, write the Sales Manager, Varnish Dept., Irvington Varnish & Insulator Co., 19 Argyle Terrace, Irvington, N. J.)



Almost Anywhere Your Trains Run
Your Closest Source for Glass is L·O·F

Your repair shops can get the following five kinds of Libbey·Owens·Ford Glass for railway cars from *local* L·O·F suppliers . . . quicker service from a closer source.

1. L·O·F HEAT ABSORBING PLATE GLASS—This pale, bluish-green glass cuts down sun glare and solar radiation, keeping your passengers more comfortable. It reduces incoming solar energy. That lowers the load on your air-conditioning system.

2. L·O·F SAFETY *PLATE* GLASS—For years this fine glass has been a standard in tens of millions of automobiles and many passenger trains. Safety *Plate* Glass is also the standard for the inboard pane of any double-glazed train window.

3. L·O·F PLATE AND SHEET GLASS—Long popular for single-and double-glazed passenger car windows because of the uniform standard of high quality.

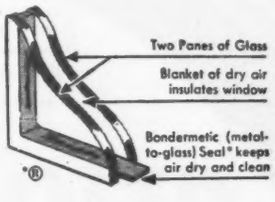
4. MIRRORS OF L·O·F PLATE GLASS—In plain form or colors, they make cars look bigger and add a modern touch of richness.

5. BLUE RIDGE *PATTERNED GLASS*—For toilet and galley windows. This decorative glass is translucent but maintains privacy.

The following are made to order for your particular needs. You can order them from your local L·O·F Distributor.

TUF-FLEX* **GLASS**—Heat-strengthened to withstand greater impact, this tempered plate glass is excellent for dining car partitions and similar uses.

THERMOPANE* **INSULATING GLASS**—Only *Thermopane* has the famous *Bondermetic Seal** that prevents dirt and moisture from getting between the panes. Railroad *Thermopane* is made with an inboard pane of Safety Glass and an outboard pane of either L·O·F Heat Absorbing Plate Glass or L·O·F Plate Glass.

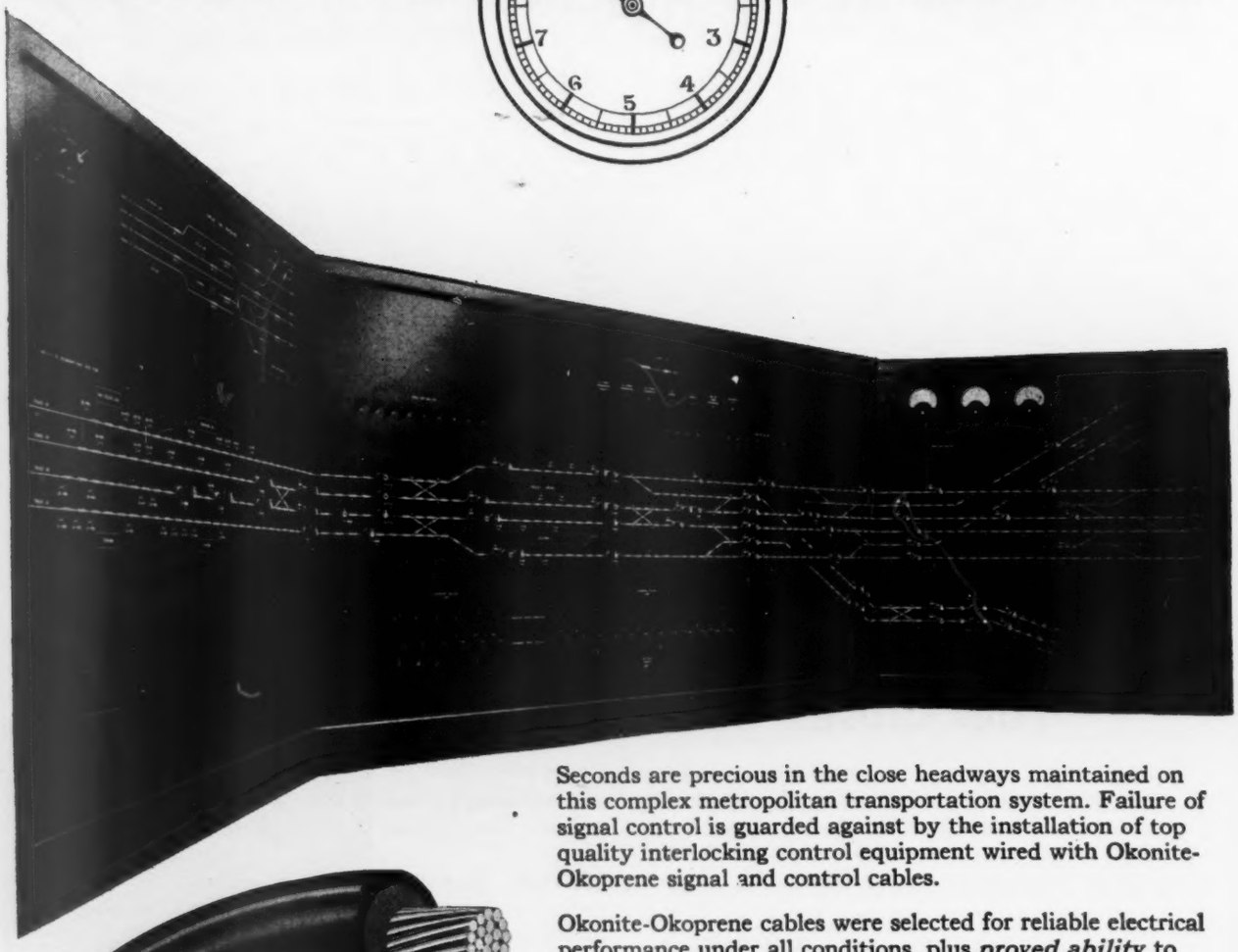


Don't let your maintenance shops be kept waiting. A nearby L·O·F Distributor can supply the type, size and thickness of glass you need for quick replacement. You'll find his name in the yellow pages of phone books in many principal cities. Libbey·Owens·Ford Glass Company, 38123 Nicholas Building, Toledo 3, Ohio.

*®

LIBBEY·OWENS·FORD GLASS for RAILWAY CARS

SIGNAL CONTROL FOR "STOP WATCH" PASSENGER TRAFFIC



Typical construction of Okonite-Okoprene cable used on the interlocking control panel shown above.

Seconds are precious in the close headways maintained on this complex metropolitan transportation system. Failure of signal control is guarded against by the installation of top quality interlocking control equipment wired with Okonite-Okoprene signal and control cables.

Okonite-Okoprene cables were selected for reliable electrical performance under all conditions, plus *proved ability* to retain vital mechanical and electrical characteristics for long periods of service. This plus factor—exceptionally long life—has been demonstrated in installation after installation on nearly 100 Class 1 railroads and transportation systems.

In new installations or for replacement, Okonite-Okoprene signal and control cables are your best guarantee against operating failures caused by cable breakdown. The Okonite insulation—proved by 75 years of service—retains its tensile strength and electrical values longer. The Okoprene sheath is tough and durable—will not deteriorate in moisture, support combustion nor communicate flame along the cable.

For detailed information on Okonite-Okoprene, write today to The Okonite Company, Passaic, New Jersey.

1564

OKONITE insulated cables

SINCE 1878

75th ANNIVERSARY

ONLY TWO PARTS

ALCOLID® the lifetime journal box lid

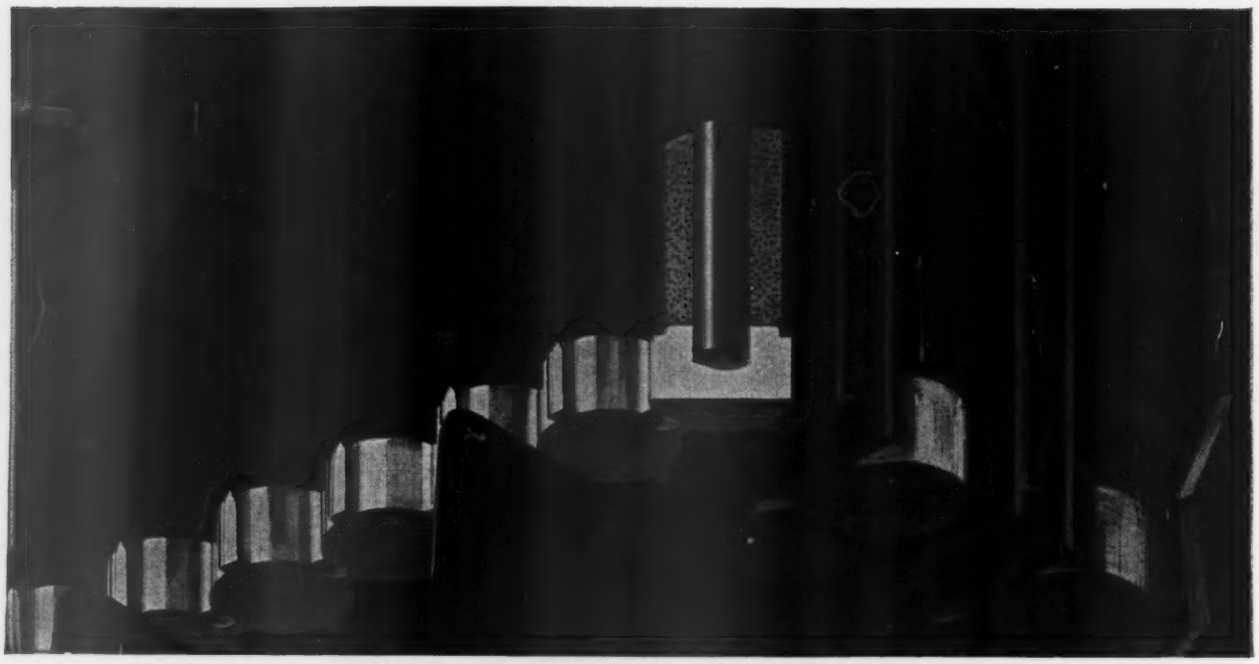
With only these two parts the ALCOLID is one of the simplest and most dependable lids ever designed, giving up to 17 years of freight service* with only negligible evidences of wear.

The sturdy, full-section all-steel construction of the ALCOLID has no thin parts to rust away. The square-headed, locked retaining pin never rotates, thus eliminating wear on the eyes of the hood. Fully articulated, the ALCOLID provides tight closure; a rugged, torsional spring exerts fifty pounds pressure to prevent lid vibration. In addition to all this, ALCOLIDS can be installed in a matter of seconds.

Why not take advantage of all these features? Send for full information to your ALCO sales representative in New York, Richmond, Cleveland, Chicago, St. Louis, St. Paul. San Francisco.

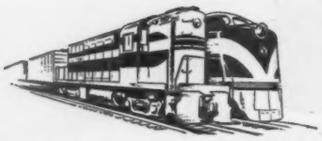
*according to actual test runs

ALCOLID
PATENTED
RAILWAY STEEL-SPRING DIVISION
AMERICAN LOCOMOTIVE COMPANY



FOR DEPENDABLE DIESEL STARTING

Exide-Ironclad BATTERIES



When you specify an Exide-Ironclad Battery, you are assured of:

QUICK BREAKAWAY and fast acceleration of engine to firing speed.

HIGH POWER RESERVE at all times for operation of control equipment.

HIGH AVAILABILITY—uninterrupted on-line service.

LOW COSTS of operation, maintenance, depreciation.

INHERENT SAFETY . . . and clean, quiet, vibrationless operation.

Rugged Exide-Ironclad Batteries are available in interchangeable sizes for diesel-electric locomotives of every make.

HERE'S WHY YOU GET MORE WITH EXIDE-IRONCLAD
Positive plate, containing corrosion-resistant Silvium, is different . . . unique . . . exclusive! No other type of positive plate can offer you the advantages of the Exide-Ironclad with its slotted tubes, permanently sealed with the new polyethylene bottom bar. More active material is exposed to the electrolyte . . . for greater power. More active material is retained . . . providing higher battery capacity for a longer working life.

Exide-Ironclad is Your Best Battery Buy . . . *AT ANY PRICE*

WHEN IT'S AN EXIDE-IRONCLAD YOUR DIESELS START

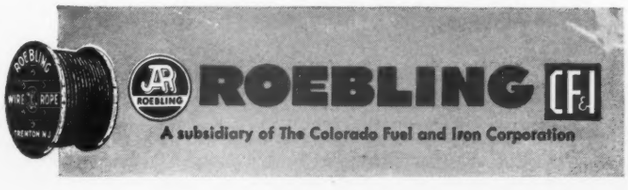
1888 . . . DEPENDABLE BATTERIES FOR 65 YEARS . . . 1953

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 2 • *Exide Batteries of Canada, Limited, Toronto*

"EXIDE-IRONCLAD" and "SILVIUM" *Reg. T.M. U.S. Pat. Off.*

IT'S JUST THAT SIMPLE. There's only one reason in the world why so many materials handling men prefer Roebling wire rope and slings... *they cost a lot less on the job than any others.*

For top efficiency and economy, call your nearest Roebling office for a Field Man. He'll suggest the best ropes and Flatweave and All-Purpose Slings for your work.



JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 330 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, TRENTON 2, N. J.

Train of 85 loaded cars of coal, 6400 actual tons, being handled down 2 per cent grade between Hiawatha and Martin, Utah, by one Alco 1600-hp 6-motor road switcher equipped with auxiliary compressor.

"Alco 1600-hp 6-motor road switchers have cut our train operating costs 30%"

. . . says L. A. Kane, President and General Manager, Utah Railway

"We began dieselization," says the president of the coal-carrying Utah, "with the purchase of six Alco 1600-hp 6-motor road switchers. That was in January, 1952. Today, those six Alco units have cut our train operating costs by about 30 per cent and have considerably increased our operating efficiency."

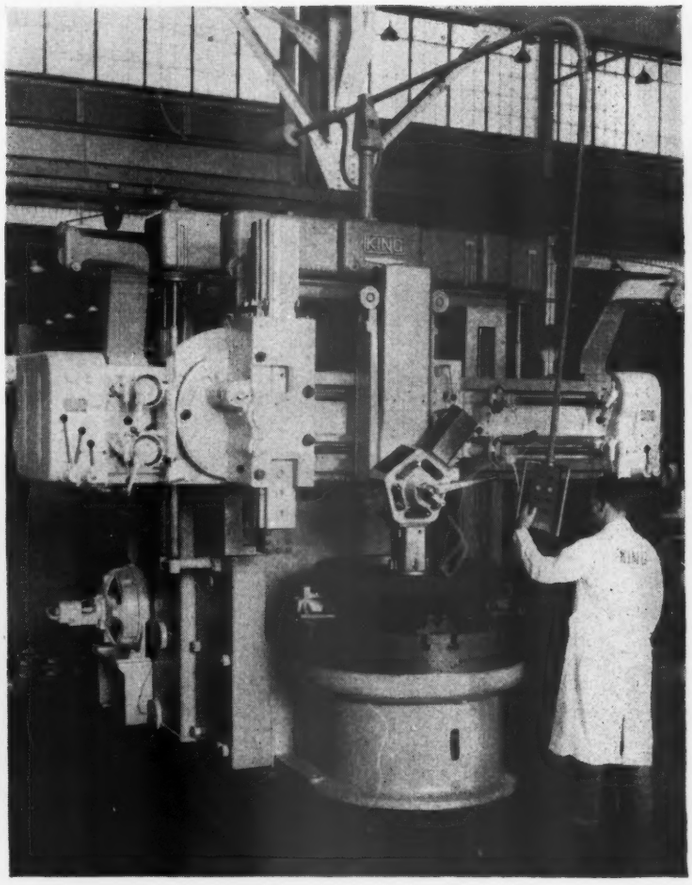
Mr. Kane gives two examples: "On our heavy mine-run switching assignments

Alco

AMERICAN

New 52" KING, *a modified-standard design for boring, facing and turning diesel locomotive wheels. Ten sizes available—30" to 144"—the widest size range among vertical mills*

KING
VERTICAL BORING & TURNING MACHINES



---LOWER THE COST *of* LOCOMOTIVE REPAIRS

To speed your maintenance schedules and get the highest availability from your locomotives, put new KING mills to work in your shops. You'll get rapid production, coupled with dependable accuracy, on a wide range of railroad jobs.

New KING mills have increased power and time-saving ease of operation. They are massive machines, of extra-rigid construction, capable of taking the heaviest cuts at the highest speeds modern cutting tools can handle. Investigate these "top profit" machine tools for your modernized maintenance program.

Let your KING distributor show you the many features which lower locomotive repair costs!

American Steel Foundries

KING MACHINE TOOL DIVISION

1150 TENNESSEE AVENUE — CINCINNATI 29, OHIO

How Gulf Dieselmotive Oil

combats harmful engine deposits to increase locomotive availability and reduce maintenance costs:

1. Effective detergent action of Gulf Dieselmotive Oil prevents harmful piston ring belt deposits (has the right combination and the right concentration of the right additives).
2. The selected base stocks for Gulf Dieselmotive Oil insure against hard deposits on the piston crown and area above first ring.
3. The base stocks for Gulf Dieselmotive Oil are 100% solvent refined—this insures greater stability and better bearing protection.

Call in a Gulf Sales Engineer and ask him to recommend the proper grade of this quality lubricant to improve lubrication and reduce maintenance costs for your Diesel locomotives. Write, wire, or phone your nearest Gulf office today.

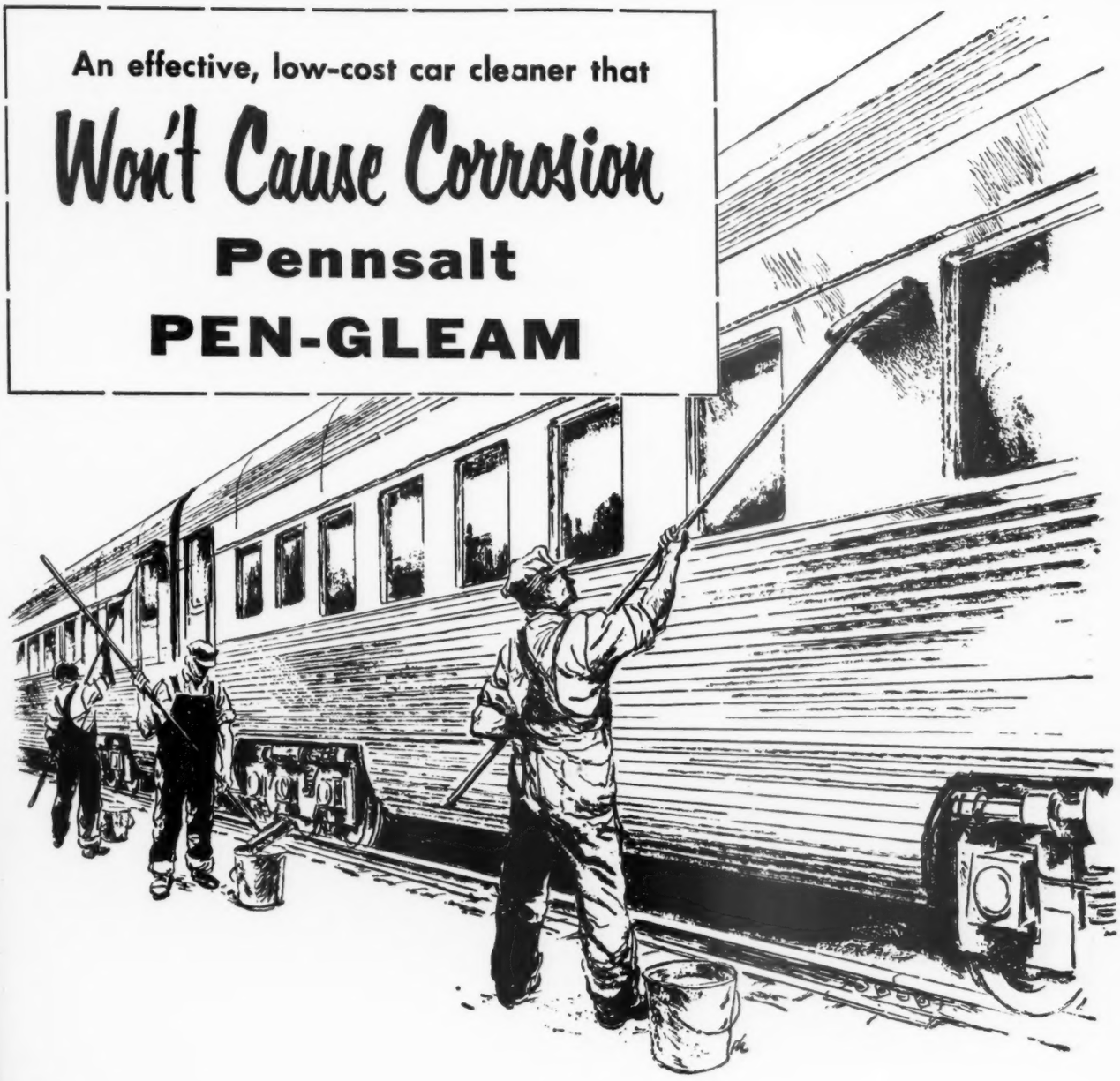
GULF

GULF OIL CORPORATION
GULF REFINING COMPANY
PITTSBURGH 30, PA.

An effective, low-cost car cleaner that

Won't Cause Corrosion

Pennsalt PEN-GLEAM



FOR "special" trains that must be clean and bright *all* the time, Pennsalt offers a special cleaner—Pen-Gleam. It can be used regularly and frequently *without* harm to paint or metal.

Pen-Gleam is a mildly alkaline compound containing relatively large proportions of wetting agents and water-softening ingredients. It is economical to buy and use (only 1-2 oz. per gal.); works well in hard or soft water; dissolves quickly and completely even in cold water.

This efficient cleaner rinses fast and free from paint, metal, or glass; will *not* attack paint at use concentrations; is easy on worker's hands. Under the name "Cleaner 85" it has long been used by leading roads for washing diesel locomotives.

To users, Pennsalt recommends that cars be given a periodic acid wash to remove accumulated oxide film, and then returned to a Pen-Gleam washing cycle. Pen-Gleam will do an excellent job of maintaining a car's like-new appearance if it is used regularly. It is also highly recommended for washing coach interiors, and as a general building-maintenance cleaner.

Like To See For Yourself? The only way to thoroughly evaluate this non-corroding cleaner is to test it on one or more of your road's cars. A Pennsalt Representative will arrange such a demonstration at your convenience. Or, we'll be glad to send you further product information. Write: Maintenance Chemicals Dept., *East:* Pennsylvania Salt Mfg. Co., 466 Widener Bldg., Phila. 7, Pa. *West:* Pennsylvania Salt Mfg. Co. of Washington, 2168 Shattuck Ave., Berkeley 4, Calif.

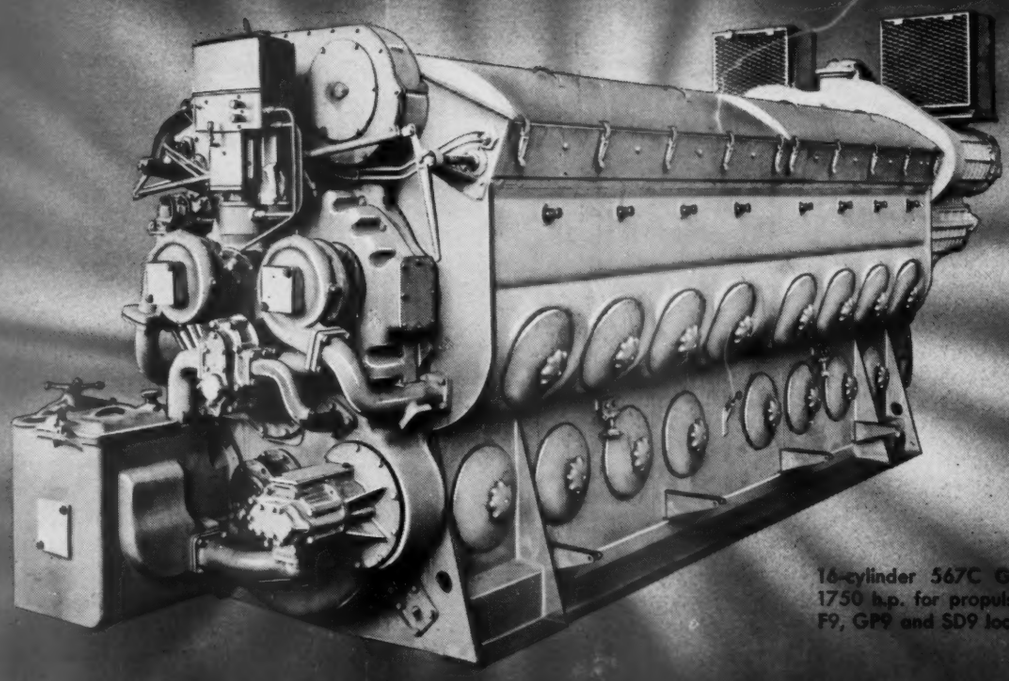
Pennsalt Chemicals

GREAT NEW LINE OF GENERAL

*Up to 17% more horsepower * Increased tracti*

E9–2400 H.P. | **F9–1750 H.P.** | **GP9–1750 H.P.**

NEW, MORE POWERFUL 567C ENGINE

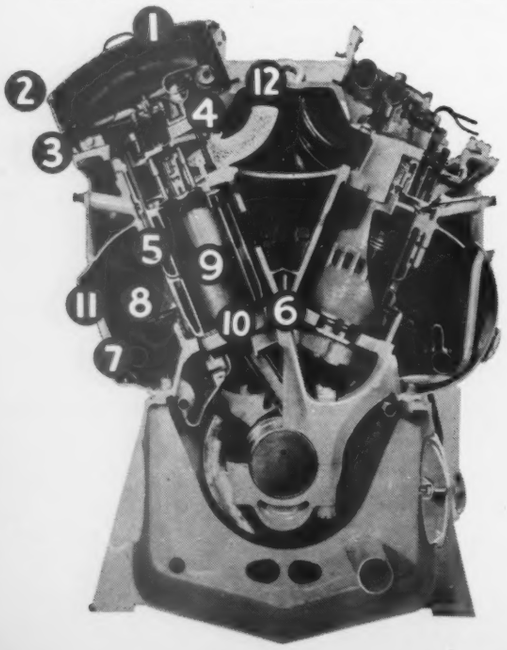


16-cylinder 567C General Motors Diesel engine, 1750 h.p. for propulsion @ 835 r.p.m. Powers new F9, GP9 and SD9 locomotives.

COMPLETELY NEW CRANKCASE designed for longer life, reduced maintenance

New 567C engine leads list of advances in General Motors great new line of Diesel locomotives. Heavier frame members help reduce stress level of entire crankcase. Replaceable water inlet manifold has jumper lines individually connected to newly developed liners and heads to eliminate large water seals on cylinder liners and stress plate water corrosion. New synthetic oil seals keep oil in—seal dirt out. New replaceable wear ring for lower pilot liner takes wear off integral part of the crankcase. All these major improvements apply in all sizes—6-, 8-, 12-, and 16-cylinder models.

Horsepower output of the new "C" engine is up to 17% higher than that of earlier "B" model because of larger injectors and slightly higher speeds. Horsepower ratings of the new locomotive line are increased where the higher power output can be effectively used. Shown below are design and construction features which help this great new General Motors locomotive engine give lower-cost, longer-life service.



LOOK AT THESE NEW DEVELOPMENTS

1 NEW Top-Deck Covers,* hinged and latched, permit easy inspection without removing covers.

2 NEW Synthetic Rubber Seal* prevents oil leaks at top-deck covers.

3 NEW Heavier Cover Frame* with enclosed fuel lines for protection and warmer location.

4 NEW Cylinder Head designed for easier maintenance, longer life.

5 NEW Cylinder Liner* with extended water jacket closed at bottom.

6 NEW Heavier Frame Members—stronger fabricated frame for greater durability.

7 NEW Water Inlet Manifold* does away with water on stress plates, eliminating possibility of corrosion fatigue. Replaceable steel tube manifold requires no welding to crankcase.

8 NEW Water Jumper Lines* to individual liners and heads eliminate large, expensive water seals on liners. The only seal used is a small "O" ring at the cylinder head to water discharge manifold jumper—easy to inspect and replaceable without removing major assemblies.

9 NEW Trunnion-Rod and Piston Carrier* provides increased lubrication, extends life in wrist pin area.

10 NEW Replaceable Wear Ring* between liner and stress plate—eliminates wear on crankcase liner pilot bore.

11 NEW Handhole Cover with new seals to eliminate oil leaks.

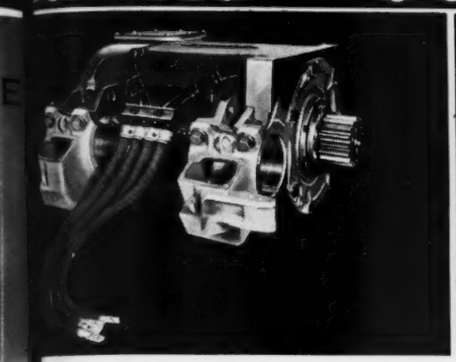
12 NEW Exhaust Manifold Cap Screws replace studs for better stress distribution and stronger fastening.

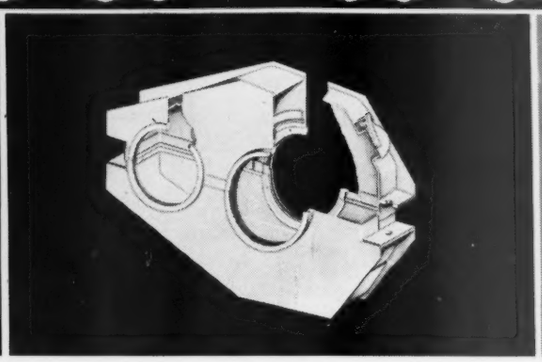
**Improvements applicable to all 567 engines when modernized.*

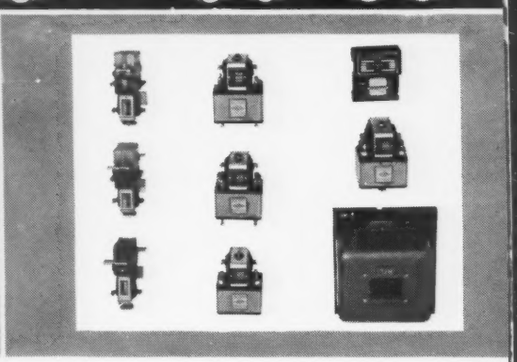
MOTORS DIESEL LOCOMOTIVES

Longer Life • Lower maintenance costs

SD9–1750 H.P. | SW600–600 H.P. | SW900–900 H.P. | SW1200–1200 H.P.



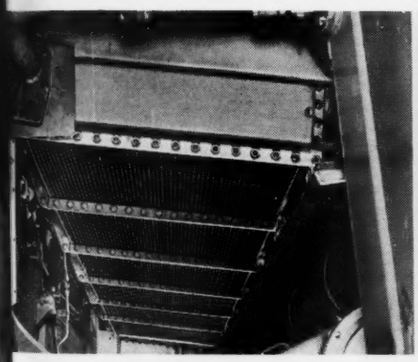


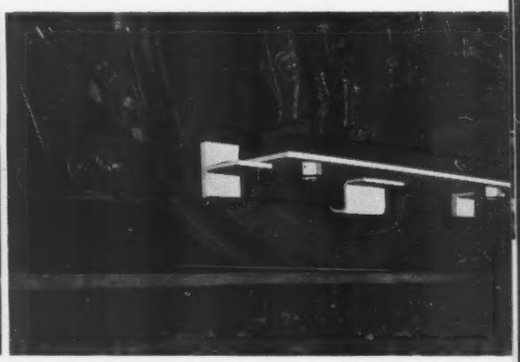


D-37 TRACTION MOTOR eliminates short-time ...g. New moistureproof stator insulation per- ...an increase in traction motor ratings and ...nation of short-time ratings in most ap- ...tions. Operating at higher speeds and lower ...eratures than the D-27 motor, the new D-37 ...has sealed lubricant armature bearings and ... polyester glass insulated brush holder which ...withstand flash-overs without damage.

NEW SEALED GEAR CASE WITH STABLE LUBRICANT—up to ten times previous performance. Completely redesigned traction motor gear case with new stable lubricant further reduces maintenance costs on new General Motors locomotives. This new case ran more than a year in heavy-service experimental tests without loss or addition of lubricant. Barring damage to seals, this new gear case can go at least ten times as far as the previous model without change or addition of lubricant.

NEW CONTROL APPARATUS — six-year maintenance-free. Greatly simplified electrical control apparatus is designed for six-year maintenance-free operation and includes: (1) totally enclosed interlocks; (2) new battery field, shunt field and battery charging contactors; (3) new motor shunting contactors; (4) parallel relay; (5) new starting contactors; and (6) solid cam switch contacts.





...COOLING CAPACITY for more horsepower. ...e cooling capacity is increased where higher ...power output of the 16-cylinder 567C engine ...d. F9, GP9, and SD9 units have six-inch ...tor cores with necessary hood and hatch ...gement modifications. Cooling fan speed is ...r in SW9 and TR9 models. F9, GP9 and ... units get increased oil cooling from new, ...r oil cooler with 14-fin (instead of 10-fin)

NEW AUTOMATIC WHEEL-SLIP CONTROL improves performance — reduces maintenance. New, improved wheel-slip control in F9, GP9, SD9 and E9 road units improves locomotive operation under slipping conditions and cuts sanding requirements. A sensitive creep relay anticipates slipping and automatically starts sander. Unloading device automatically reduces power from main generator to traction motors during wheel-slip and then gradually reapplies power under

NEW BRAKE RIGGING STABILIZER extends life—reduces maintenance. Newly developed stabilizer, added to clasp-brake rigging on F9, GP9 and SD9 models, eliminates lateral play in the linkage to extend life and reduce maintenance.

* * *

controlled conditions for maximum use of available adhesion. The E9 locomotive is also equipped with an improved system of high-speed wheel-slip control.

GREATER VALUE IN

GENERAL MOTORS LOCOMOTIVES

READY IN JANUARY, 1954

GP9—1750 H.P. General Purpose Locomotive

F9 — 1750 H.P. Freight and Heavy-Duty Passenger Locomotive

SD9—1750 H.P. 6-Motor Road Switcher

E9 — 2400 H.P. High-Speed Passenger Locomotive

SW1200 — 1200 H.P. 125-Ton Switching Locomotive

SW900—900 H.P. 105-125-Ton Switching Locomotive

SW600 — 600 H.P. 100-Ton Switching Locomotive

TR9—1800 H.P. 230-Ton Transfer Locomotive

TR12—2400 H.P. 250-Ton Transfer Locomotive

ELECTRO-MOTIVE DIVISION • GENERAL MOTORS

La Grange, Illinois • Home of the Diesel Locomotive

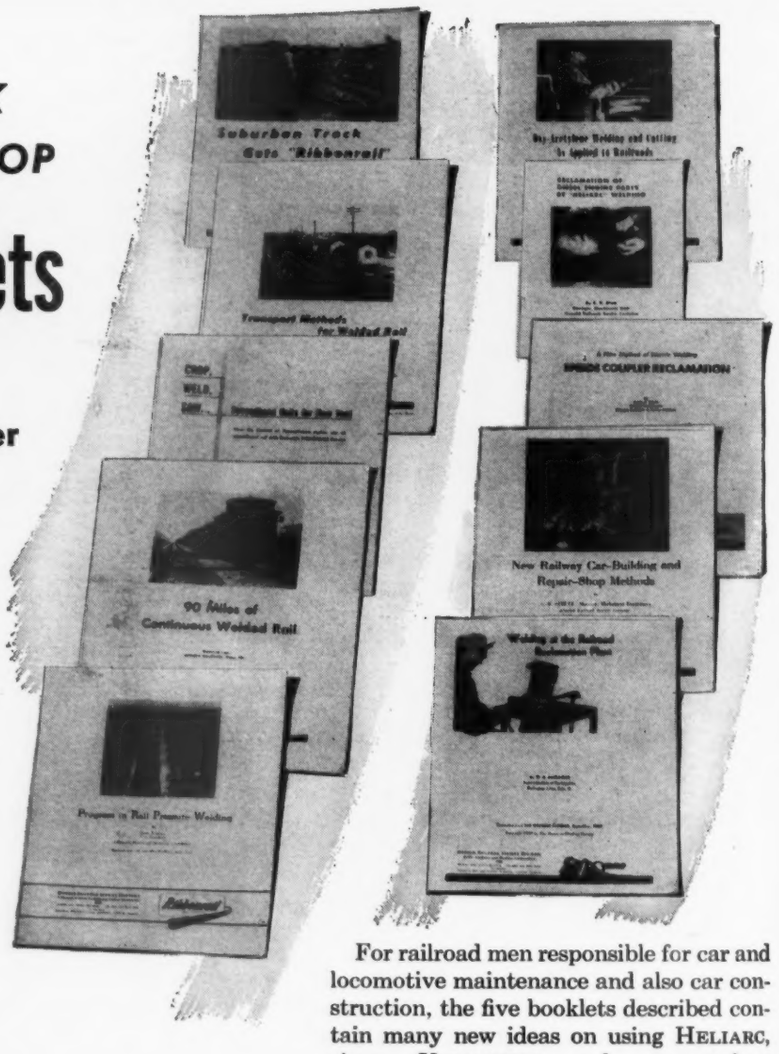
GENERAL MOTORS LOCOMOTIVES

for the man

...ON TRACK
...IN THE SHOP

10 Helpful Booklets

use coupon below to order by number


Suburban Track Gets "Ribbonrail"
Transport Methods for Welded Rail
90 Miles of Continuous Welded Rail
Progress in Rail Pressure Welding
New Railway Car-Building and Repair-Shop Methods
Welding at the Railroad Reclamation Plant

For the engineering department and others interested, five reprints are on continuous rail and OXWELD'S RIBBONRAIL Service.

1 "Suburban Track Gets RIBBONRAIL"—the laying and use of continuous rail in busy Chicago suburban traffic.

2 "Transport Methods for Welded Rail"—answers many questions on how continuous rail is transported and laid.

3 "Crop, Weld, Saw—Secondhand Rails for New Yard"—shows how an Eastern railroad prepared and welded rail into longer lengths for a new switch yard.

4 "90 Miles of Continuous Welded Rail"—important facts on welded rail engineering and economics from a railroad that has wide experience with RIBBONRAIL Service.

5 "Progress in Rail Pressure Welding"—an 8-page reprint of a technical paper delivered at a national meeting of the American Welding Society.

The terms "Heliarc" and "Unionmelt" are registered trade-marks and "Ribbonrail" is a service-mark of Union Carbide and Carbon Corporation.

Use the coupon below to get any or all of these *free* booklets. Be sure to designate the booklets you want by circling the numbers on the coupon.

FILL OUT AND MAIL

For railroad men responsible for car and locomotive maintenance and also car construction, the five booklets described contain many new ideas on using HELIARC, sigma, UNIONMELT, and oxy-acetylene welding.

6 "Oxy-Acetylene Welding and Cutting as Applied to Railroads"—a technical paper written by the welding supervisor of a large southern railroad. Covers car and diesel locomotive practices.

7 "Reclamation of Diesel Engine Parts by HELIARC Welding"—repairs of many types of diesel parts—aluminum, stainless, cast iron—are given in this 10-page reprint.

8 "A New Method of Electric Welding Speeds Coupler Reclamation"—a large Midwestern road has adopted UNIONMELT welding to reclaim worn couplers more efficiently.

9 "New Railway Car-Building and Repair Shop Methods"—latest wrinkles in car-building by UNIONMELT welding and also valuable information on HELIARC and sigma welding.

10 "Welding at the Railroad Reclamation Plant"—how a Midwestern railroad that reclaims 175 different parts uses the oxy-acetylene process to make worn parts usable.

Oxweld Railroad Service Company
Room 1320, 230 North Michigan Avenue
Chicago 1, Illinois

Gentlemen:

Please send me the booklets which I have circled.

1 2 3 4 5 6 7 8 9 10

NAME..... POSITION.....

RAILROAD.....

ADDRESS.....

Circle the numbers of the booklets you want. If you want more than one copy please indicate.

ELECTRICAL INSULATION IS OUR SPECIALTY

Q. *What ONE wire and cable producer grows its own natural rubber, and makes its own synthetic rubber?*

A. UNITED STATES RUBBER COMPANY.

Q. *What ONE wire and cable producer makes plastics?*

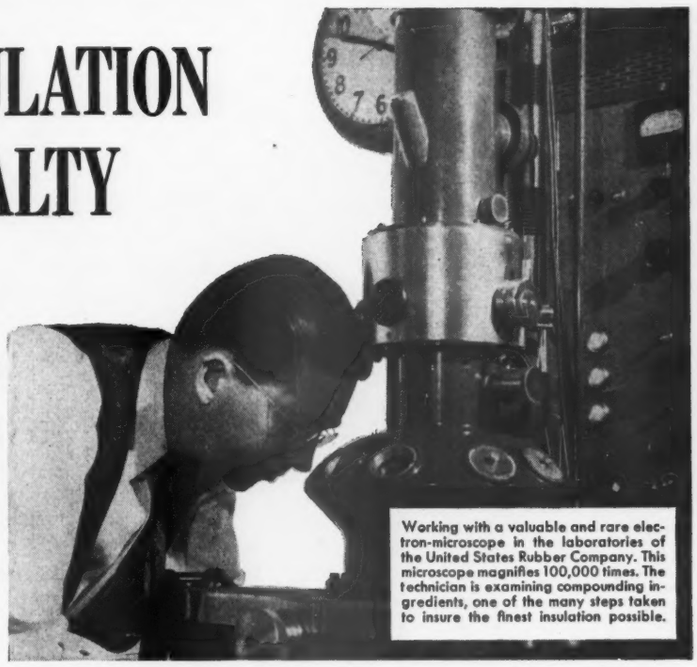
A. "U. S."

Q. *What is the most important part of wire and cable?*

A. The insulation.

Q. *Who is best equipped to make wire and cable with superior insulation?*

A. U. S. RUBBER—which grows its own natural rubber, makes its own synthetic rubber, manufactures its own plastics.



Working with a valuable and rare electron-microscope in the laboratories of the United States Rubber Company. This microscope magnifies 100,000 times. The technician is examining compounding ingredients, one of the many steps taken to insure the finest insulation possible.

Isn't it logical that a rubber company should make the best wire and cable insulation there is? U. S. Rubber has been a pioneer in insulation for over 70 years—has amassed in that time a stockpile of research data and experience that can't be beat. Electrical insulation is a "U. S." specialty!

Electrical insulation makes the difference between superior and ordinary wire and cable. Conductors of all manufacturers are standard, but insulation must be the best that science can produce. That's why your best bet in wire and cable is U. S. Rubber.

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Tensile Lbs./Sq. In.	500	450	450	1800	1600
Elongation Per Cent	250	200	200	300	250

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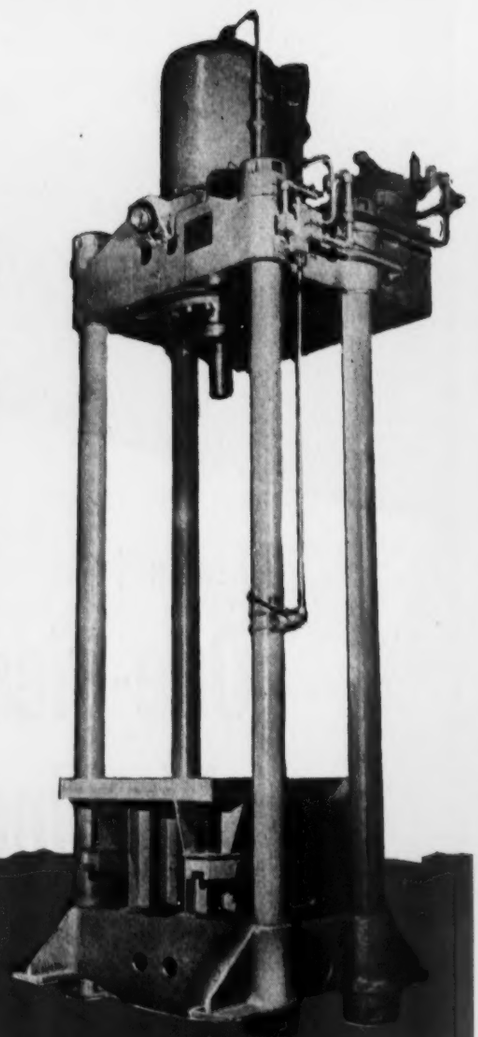

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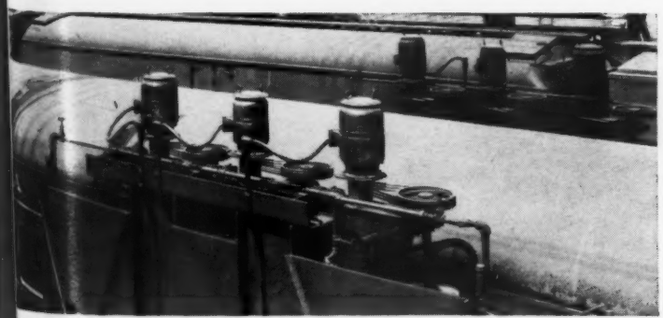

G-E 2-hp and 3-hp induction motors driving this Whiting car washer have run 112 hours a week for 8 years, giving dependable service.

Two hundred cars a day pass through the Whiting car washer in the Pennsylvania Railroad's Pittsburgh yard. The washer is equipped with G-E fan-cooled induction motors, which run 16 hours a day, 7 days a week. Yet, a once-a-year lubrication inspection is the only maintenance required.

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NEW OIL BATH AIR FILTERS CUT DIESEL ENGINE WEAR AND MAINTENANCE COSTS

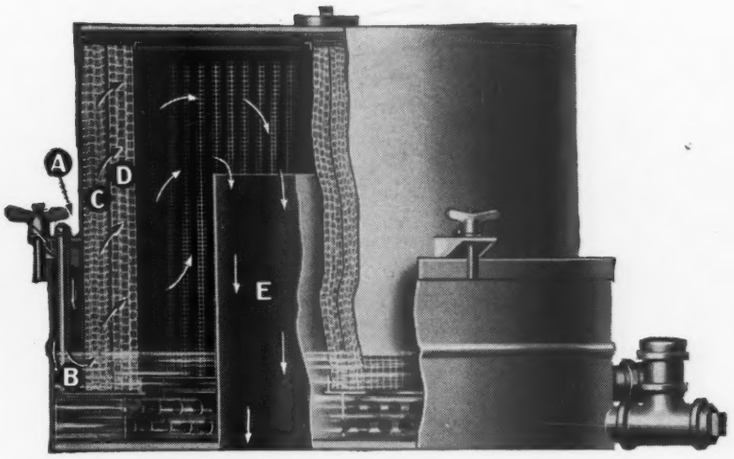
THIS NEW Air-Maze filter scrubs diesel locomotive intake air clean in a bath of oil. Abrasive dust can't get through to wear out rings, ring grooves and liners. Engine overhaul costs are reduced.

Servicing costs are cut, too. In areas where airborne dirt concentrations are heavy, ordinary filters must be cleaned as often as twice a week. By contrast, Air-Maze oil bath filters go a month or more without changing oil!

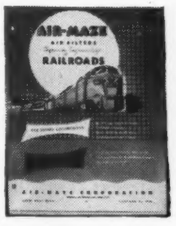
With Air-Maze oil bath filters on the job, turbo-charger maintenance is minimized. There's less dirt build-up on the turbo vanes, turbo wheels stay in balance, bearings last longer.

More than 100 diesel locomotives—ranging from 600 to 2250 h.p.—are already rolling with new Air-Maze oil bath filters on their engine air intakes. Indications are that the savings they'll realize in only a year will equal their investment.

Why not let Air-Maze oil bath air filters help you slash your diesel locomotive filtering costs. Call your nearby Air-Maze representative or write, The Air-Maze Corp., 25000 Miles Ave., Cleveland 28, Ohio.



HOW IT WORKS: Dirt laden air entering at A is deflected by skirt toward oil sump. Air breaks oil seal at B and changes direction, dropping larger dirt particles from air stream. Increased air velocity at B causes turbulent scrubbing action of air by oil, removing bulk of dirt particles. Oil is constantly carried onto diffuser screen C and filter element D by air stream, and washes down into sump and remaining dirt particles which have been impinged on the filter element, thus keeping it clean at all times. Filter element also removes all entrained oil from air stream so that only clean oil-free air enters riser tube E and air intake of equipment.



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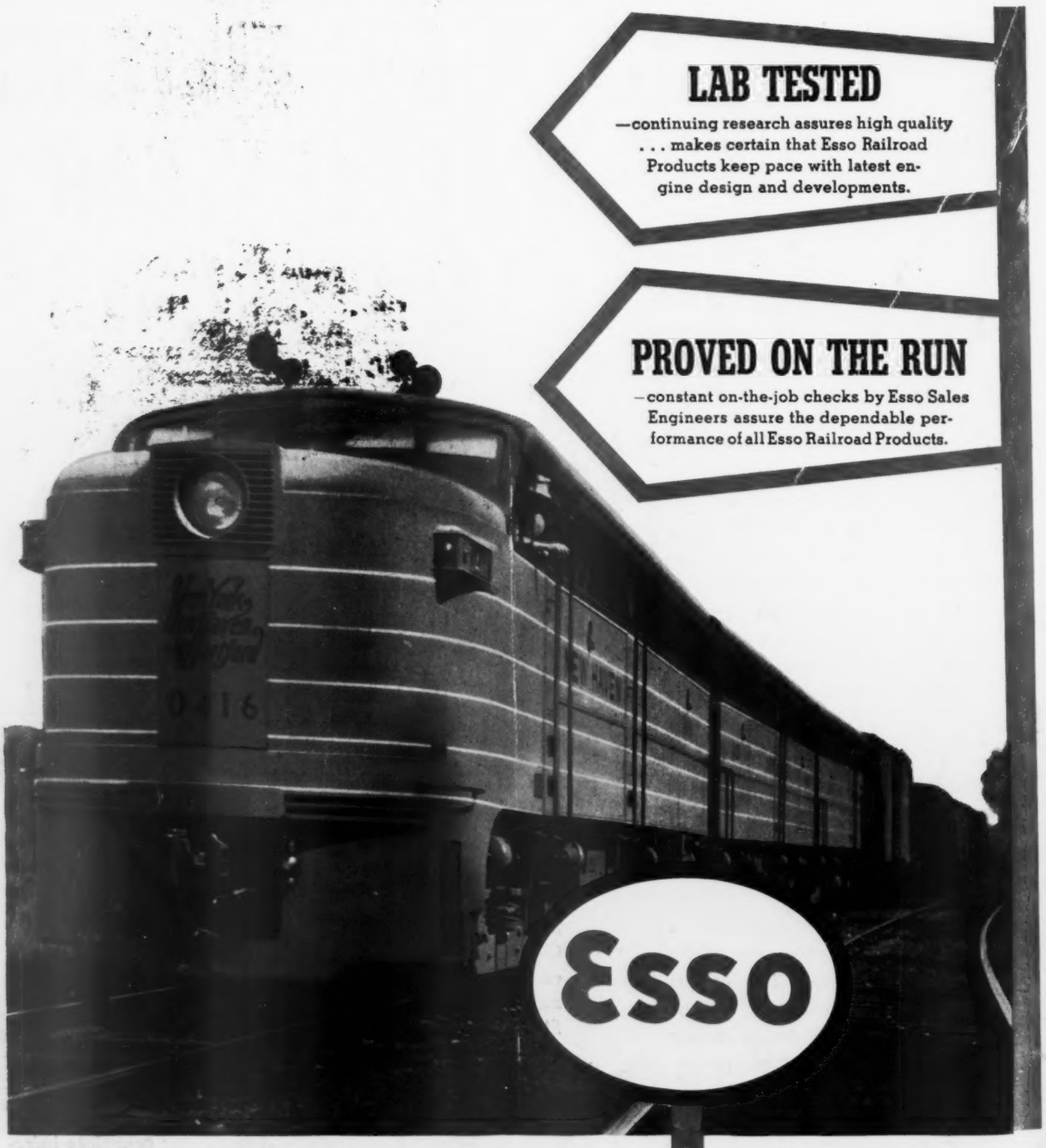
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